

Aesthetic Assessment *of the Proposed* **Kingdom Community Wind Project**

Includes Orderly Development & Public Investments

Lowell, Vermont • May, 2010

Prepared for
Green Mountain Power
163 Acorn Lane
Colchester, Vermont 05446

Prepared by
LandWorks
228 Maple Street, Suite 32
Middlebury, Vermont 05753
Phone: 802.388.3011
Fax: 802.388.1950
www.landworksvt.com
info@landworksvt.com

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1. Project Background

1. Project Background

1.1 Introduction

This aesthetic assessment and report is submitted to Green Mountain Power (GMP) in response to its request for assistance in evaluating the aesthetic effects associated with the proposed Kingdom Community Wind Project, located in the town of Lowell, Vermont. This report will be referenced by the testimony of David Raphael, ASLA, Principal and Landscape Architect with LandWorks, the firm preparing this assessment. Thus, this report and its accompanying appendices will become a part of the overall aesthetics testimony submitted by GMP in its application for a Certificate of Public Good (CPG) from the Vermont Public Service Board (PSB) to construct an energy (wind) generation facility under Section 248 of Title 30 of the Vermont Statutes.

The methodology for this Project includes visual and cartographic analyses, document research and review. Our primary analyses assess the Project's visibility and potential for visual and aesthetic impacts, with a focus on vantage points from major federal, state or local roads, relationships to nearby areas of public interest, high scenic value and/or official designation as a cultural, aesthetic or recreational facility or resource. Locations that involve residential areas in close proximity to the proposed wind farm were also considered. We have used on-site and field study to reinforce our analyses and findings, and have also documented public sentiment and concerns in this process.

"Our analysis, however, does not end with the results of the Quechee test. Instead, our assessment of whether a particular project will have an 'undue' adverse effect on aesthetics and scenic or natural beauty is significantly informed by the overall societal benefits of the project" ~ Findings, PSB Docket 6860

The aesthetic analysis for this Project has been conducted within the parameters set forth in Section 248 for review of utility scale energy generation and transmission projects. The analysis thus follows and responds to the process and determinations required under the Quechee Analysis, established in 1985 in the Environmental Board's Quechee Lakes decision. This analysis also recognizes that the Public Service Board weighs "societal benefits" when considering the aesthetic impacts of projects within its purview.

Additionally, our analysis and exhibits follow the recommendation of the Vermont Commission on Wind Energy Regulatory Policy that visual impacts within a 10-mile radius of the Project site be evaluated. The analysis also benefits from and incorporates elements from a variety of wind resource reports found on the Vermont Department of Public Service's website, such as *Wind Energy Planning Resources for Utility-Scale Systems in Vermont* issued as a product of the Wind Siting Consensus Building Project in October 2002.

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1.2 Report Organization and Contents

This analysis is organized around and relies on an extensive narrative of the Quechee “Test” as it applies to this proposal. It also includes a discussion of the aesthetic qualities of wind turbines, the dynamic nature of the Vermont landscape over time, public opinion with regard to wind farms in general, and a number of exhibits and studies, including the following:

1. Overall potential viewshed map.
2. Visual simulations of the Project from two viewing locations within a ten-mile radius of the Project.
3. Photographic inventory presenting the character of the area and views to the Project area from a wide range of public locations.
4. Documentation with regard to the “View from the Road,” assessing the visibility and duration of visibility of the proposed wind turbine Project site from local and regional public roads.
5. Analysis of the aesthetic impacts, if any, which may result from the further development of the access roads to the wind farm site, the transmission corridor from the site to the substation and its interconnection with the regional transmission network, and the substation itself.
6. Project overview map, and additional analysis and context maps.
7. An overview of public opinion as it relates to wind energy.
8. A review of applicable town and regional plans.

The following discussions, narratives and appendices present a compelling case for the suitability of utility scale wind turbines for the Kingdom Community Wind Project. Vermont’s landscape is not static and has evolved through the years to readily accommodate changing technology, changing uses and changing culture. Therefore, these appendices, the accompanying report narrative and expert testimony collectively demonstrate and conclude that the Project will not result in an undue, adverse impact on aesthetics.

1.3 Project Background and Description

Kingdom Community Wind (KCW) is a proposed wind-powered electric generating project to be constructed on approximately 3.2 miles of the Lowell Mountains ridgeline located on private lands in the Town of Lowell, Vermont (see *Appendix 1. Overview Map*). GMP has submitted a petition for a CPG authorizing it to construct the KCW Project and its related elements under Section 248 of Title 30 of the Vermont Statutes.

1. Project Background

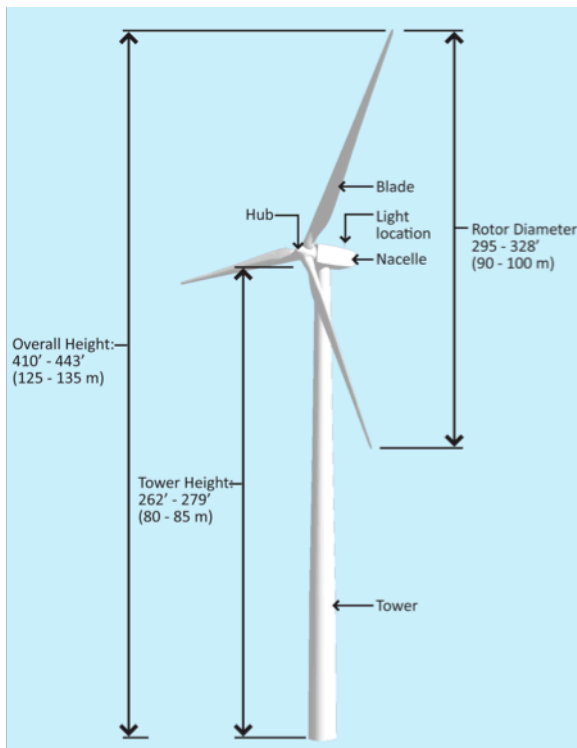


Figure 1: Typical Wind Turbine Components

The primary components of the Project are 20 to 21, 2.5 to 3.0-megawatt turbines, with a maximum installed capacity of 63 megawatts. The turbines being considered are designed to have 262 foot (80 m) to 279 foot (85 m) support towers, with rotors 295 feet (90 m) to 328 (100 m) in diameter. The total height from the base of the turbine to the tip of a blade at its highest position will range from 410 feet (125 m) to 443 feet (135 m) (see Figure 1).

The Federal Aviation Administration (FAA) standards identify lighting protocols for all structures above 200 feet in height. Thus, some of the turbines will be required to have flashing, night-time red lights, mounted atop the nacelle (unit housing the generator, gearbox, and other operational equipment). No white or daytime strobe lights would be required. GMP will continue to work with the FAA to develop a final lighting plan that minimizes lighting while ensuring compliance with FAA standards.

Although the ultimate number of wind turbines, size, and manufacturer of KCW have not yet been determined by GMP, the “worst case” turbine scenario with a 21-turbine layout and a turbine height of 443 feet (135 m) was used to evaluate potential visual impacts for the purposes of this analysis. The turbine array will be located along 3.2 miles of the Lowell Mountain ridgeline, with elevations ranging from 2190' to 2640'. In Lowell, the closest turbine to the village center is approximately 2.9 miles away, and the nearest year-round single-family residential home is 3540 feet (.67 miles) away on Eden Road.¹ In Albany, the closest turbine to the village center is approximately 2.5 miles away. The closest turbine to VT Route 100 is approximately 1.1 mile away from the highway centerline.

Vermont Route 100 parallels the Lowell Mountain range to the west through the town of Lowell, and Vermont Route 14 parallels the mountain range to the east through the town of Albany. To the north, Vermont Route 58 climbs up over the mountain range, connecting the east and west sides of the ridge. The Project's road network will add approximately 2.5+/- miles of gravel access road, connecting Route 100 in Lowell through private land to the approximately 4.2-mile crane path atop the ridgeline. The typical width of the access road will be 18 feet, but will be 32' wide in some sections to allow sufficient turning radiuses for specialized transportation

¹ Distances are approximate and were determined using ArcMap GIS software and GIS data available at the time from VCGI (e911 esite) and VERA (turbine locations).

1. Project Background

equipment necessary to move the turbine components to the site. Along the ridgeline, there will be a crane path up to 34' in width, to allow a large crawler type crane to move from one turbine site to another without the need for disassembly and reassembly. Two staging areas are proposed: up to 5-acres of a field at the intersection of the access road and Vermont Route 100, and a 0.75-acre cleared area located at the proposed site of the step up substation and maintenance building. The road is being designed for least impact construction by using an approach referred to as a "Variable Road Location Detail", as set forth by the Project Engineers Krebs & Lansing. This detail allows for flexibility during construction to balance cut and fill and to avoid environmentally sensitive areas or more difficult areas for road construction. In locations where cut and or fill is required, rip rap will be employed to reduce the extent of the cuts or fills and to ensure areas that have been regraded are stable.

The electric collection system will consist of overhead and underground lines. Along the ridgeline, lines will be buried underground between the wind turbines. The collector lines will be installed on primarily single pole configurations with cross arms to carry the conductors, although a section of H frames are being employed to lower pole heights. Low growth vegetation will be maintained or allowed to grow within the collector line corridor. The above ground height range for these structures is between 43 and 52 feet. The collector line to be developed between the ridgeline (where the collector lines are underground) and the slopeside step up substation will be located within a typical 100 foot wide corridor, narrowed in places where feasible through selective removal of vegetation to create a "feathered" effect. The corridor width is necessary to reduce the potential impacts from trees falling on the line, either from weather events or due to the health and condition of the trees. The step up substation will be a steel structure on a concrete foundation and will be approximately 140' by 140' and up to 45' in height. From the step up substation, the electric collector system will run on open wire construction to the intersection of the access road and Vermont Route 100. From here, the collector system will run north on wooden poles of approximately 35' to 52' in height in a combination of existing and new right-of-way along Vermont Route 100 to the VEC Lowell Substation, which is located northeast of the intersection of Vermont Route 58 and Vermont Route 100. The VEC Lowell substation will be re-built within the existing Irasburg #21 Substation footprint, converting it from 34.5 kV to 46 kV, while the existing Lowell #5 facility will be decommissioned and removed.

The 10.4-mile transmission line between the VEC Lowell substation and the VEC Jay 17 substation will be upgraded, which will involve several new sections of right-of-way. The new line will be built in a similar configuration to the existing line, but current pole heights, ranging from 27' to 52', will be increased to 43' to 52' with one pole at 58' near Carmel Road off Route 100 in Westfield. The Jay 17 substation will

1. Project Background

also be upgraded in a manner similar to the Lowell substation. The two-mile distribution line between the Jay 17 substation and the intersection of Cross Road and Route 105, where it interconnects with the VELCO 46 kV line, will be upgraded to 46 kV. The two-mile segment of VELCO line between this location and the proposed VEC Jay Tap switching station will be reconductored. The rebuilt line will be largely in the same location as the current line. In several sections, the line will be relocated closer to the adjacent highway, to allow for easier construction and maintenance. The new pole line will be built in a single-pole configuration similar to the existing line. The current pole heights range from approximately 35 feet to 52 feet and will be increased to approximately 43 feet to 61 feet. Further details on the various aspects of the proposed Project are provided in GMP's overview testimony and the various reports that are provided as part of this Section 248 application.

Aesthetics

A philosophy "dealing with the nature of the beautiful and with judgments concerning beauty." Beauty is defined as "...the quality or aggregate of qualities in a person or thing that gives pleasure to the senses or pleasurably exalts the mind or spirit..."

Adverse

(1) Acting or serving to oppose; antagonistic. (2) Contrary to one's interests or welfare; harmful or unfavorable. (3) Moving in an opposite or opposing direction. (4) Opposed to one's interests; unfavorable; operating to one's detriment.

Undue

(1) Exceeding or violating propriety or fitness; exceeding what is appropriate or normal; excessive; not just, proper, or legal. (2) Not appropriate or proper (or even legal) in the circumstances. (3) Lacking justification or authorization. (4) Beyond normal limits.

1.4 The Aesthetic Assessment

Under Section 248 the Vermont Public Service Board must find that the Project will not have an undue adverse impact on aesthetics. In determining whether a proposed project would have an undue adverse impact, the Board has adopted the Environmental Board's Quechee test, as summarized below:

In order to reach a determination as to whether the project will have an undue adverse effect on the aesthetics of the area, the Board employs the two-part test first outlined by the Vermont Environmental Board in Quechee, and further defined in numerous other decisions.

Pursuant to this procedure, first a determination must be made as to whether a project will have an adverse impact on aesthetics and the scenic and natural beauty. In order to find that it will have an adverse impact, a project must be out of character with its surroundings. Specific factors in making this evaluation include the nature of the project's surroundings, the compatibility of the project's design with those surroundings, the suitability of the project's colors and materials with the immediate environment, the visibility of the project, and the impact of the project on open space.

The next step in the two-part test, once a conclusion as to the adverse effect of the project has been reached, is to determine whether the adverse effect of the project is "undue." The adverse effect is considered undue when a positive finding is reached regarding any one of the following factors:

1. *Does the project violate a clear, written community standard intended to preserve the aesthetics or scenic beauty of the area?*

1. Project Background

2. *Have the applicants failed to take generally available mitigating steps which a reasonable person would take to improve the harmony of the project with its surroundings?*
3. *Does the project offend the sensibilities of the average person? Is it offensive or shocking because it is out of character with its surroundings or significantly diminishes the scenic qualities of the area?*²

In addition to the Quechee analysis, the Board's consideration of aesthetics under Section 248 is "significantly informed by overall societal benefits of the project."³

² *In Re: Petition of Tom Halnon*, CPG NM-25, Order of 3/15/01 at 10-11 ("Halnon").

³ *In Re: Northern Loop Project*, Docket 6792, Order of 7/17/03 at 28 ("Northern Loop").

2. The Quechee Analysis

As stated in the initial narrative regarding the Quechee analysis, the applicant must address the relationship of the proposed Project to its surroundings, describe its color and materials, its impact on open space, and assess other aesthetic qualities. Therefore, this section follows the Quechee analysis on a step-by-step basis. The first step asks a series of questions to ascertain whether or not a project will have an “adverse” impact. The second step determines whether that impact, if adverse, is “undue.”

LandWorks employs a number of methodologies, as stated in Section 1.2, to assess the nature of the Project’s surroundings and the potential visual and aesthetic impacts that the Project may pose to those surroundings. Extensive site reconnaissance efforts, visits to important public vantage points and scenic and conservation resources, review of two and three dimensional viewshed mapping, line of sight sections, photographic simulations and extensive travel along local and regional roads have all contributed to our assessment and the conclusions derived from that assessment. Selected private residences have also been considered as part of our review. However, it would be very difficult and overly burdensome to review every single private residence within the 10-mile viewshed of large-scale wind projects for the Quechee analysis. The logistics of such a review would be formidable, if not prohibitive, for a project such as this.

In summation, **all** of the research, activities and exhibits generated and presented as part of this assessment have informed and guided the conclusions which have been reached by the assessment.

2.1 First Step of the Quechee Analysis

2.1.A The Nature of the Project Surroundings

The Geographical Landscape

The Kingdom Community Wind project is located in the Town of Lowell in north central Vermont. This area is found within one of Vermont’s most prominent geologic features, the Green Mountains, which are a part of the Appalachian Mountain system that extends from Alabama into Canada. The “Greens” reach for 250 miles through the center of Vermont and have a maximum width of about 36 miles. Many peaks rise to more than 3,000 feet, the highest of which is Mount Mansfield at 4,393 feet. The Green Mountains are actually two somewhat parallel north-south ranges, with the Lowell Mountains comprising the main eastern ridge and are generally made up of metamorphic rock, schist being the most abundant

2. The Quechee Analysis

form. Many of these rocks also contain serpentine deposits and the asbestos fiber that sometimes accompanies them, which are found in abundance along the Lowell-Eden-Westfield border. In fact, Lowell quarry on Belvidere Mountain was the largest producing asbestos mine in the United States until its closure in 1993. The Green Mountains in this region are characterized by their high elevations, cliffs, bedrock outcrops, and talus slopes.

The Green Mountains form a unique chain pattern through this region made up of many individual, high elevation peaks, with the Missisquoi River and the Lamoille River cutting deep valleys through the spine-like chain. Topography around the Project site and vicinity is rolling to mountainous with the main spine of the Green Mountains to the west topping out at 3,360 feet on Belvidere Mountain. The valleys and ridges are northeast trending and there are numerous ponds and hilltops throughout the area. Within the 10-mile radius of the Project site, there exist a total of 38 named summits, 29 of which are over 1,500 feet in elevation⁴. These hilltops, mountains and ridges have an average elevation of 2,150 feet, with Belvidere Mountain the highest point in the area. The Lowell Mountains, at the site of the proposed Project, are not included in this list, as there are no recognized summits in this database, nor are any summits identified on the DeLorme Vermont Atlas & Gazetteer; however, available contour information indicates that elevations are between 2,000 and 2,640 feet, with an average elevation change of about 1,000 feet. Elevations in the valley to the west of the mountain tend to be higher than the eastern side, and range between 800 and 1,200 feet above sea level.

In the comprehensive guide *Wetland, Woodland, Wildland*, by Elizabeth Thompson and Eric Sorenson, the authors articulate the landforms, forest types and character of the Northern Green Mountains, the biophysical region in which the Project itself will be located: “The Northern Green Mountains are characterized by high elevations, cool summer temperatures, and acidic metamorphic rocks. Northern Hardwood Forests and high elevation communities of the Spruce-Fir Northern Hardwood Forest Formation are also characteristic” (p. 36). The authors describe the forests as having “the best examples of many high elevation and boreal communities found in Vermont.” Thus, evergreen spruce-fir forests cover extensive areas of the region with lower elevation hardwood forests of maple, yellow birch and beech. (*Wetland, Woodland, Wildland*, Elizabeth Thompson and Eric Sorenson, University Press of New England, Hanover, 2000, p. 39).

For the most part, this is a forested landscape, with a high percentage of coniferous species. Approximately 90% of the town of Lowell is forested, and 80% of the entire

⁴ From Vermont Center for Geographic Information (VCGI) data layer BasemapLandmarks_GEONAME, 2006

2. The Quechee Analysis

10-mile region is covered with vegetation at least 40 feet and taller (see *Appendix 2. Land Cover Map*). The Lowell ridgeline is also heavily wooded, with both mixed woodland and evergreen forest. The Project site itself has primarily deciduous vegetation including birch and northern hardwoods between 20 and 50 feet in height as well as some sections of coniferous forests with primarily spruce and fir species. In the lower elevation areas around the Project ridge, the forest cover is predominantly deciduous with some areas of mixed and evergreen forest. Therefore, the extensive forest cover helps to limit the visibility of the Lowell Mountain ridgeline and the proposed wind Project. Visibility through hardwood forests is also surprisingly limited even in winter, when stem and branch density combine to limit visibility through such woodlands to 50 to 100 yards. In fact, the potential viewshed indicates that only 5% of the 10-mile radius will have possible views of the Project due to intervening vegetation and topography (see *Appendix 3. Potential Visibility from Open Areas*).

The Cultural and Developed Landscape

This region of Vermont is most notably known for its low population, undeveloped areas, prime wildlife habitat and vast woodlands. It is a working landscape on which the region's residents have depended for over a century and a half. The largest source of revenue is, by far, from the harvesting, processing, and manufacturing of forest products, evidence of which can be seen on the flanks of the Lowell Mountain Range itself. Mining was also prevalent at one time, with the considerable deposits of asbestos and other minerals found here. The remains of the largest asbestos mine in the United States can be found in Lowell on the eastern flanks of Belvidere Mountain. The mine and its tailings are the most prominent visible land use in the region and are readily noticeable from the air and along many of the roads in the region, as the mine operations denuded huge areas of the mountain side. The mine was, for many years, the primary employer in the region, and Lowell's population has dropped markedly over time since the mines closure in 1993.

There is also some remnant farming in the region, and there remain some high elevation meadows, pastures and fields punctuated by farmsteads with barns and silos. Most of the open farmland however is focused along major roads such as Vermont Routes 100, 58, and 14. Likewise, most of the development, which is predominantly residential, is located along these key roads. All of the region's major employment centers, like St. Johnsbury, are relatively far from Lowell, and roughly 75% of the town's resident's travel outside of town for work. The immediate area around the Lowell Mountains is not a destination area for tourism, particularly compared with nearby locations such as Lakes Willoughby and Memphremagog and the Jay Peak area. Thus, most of the commercial and retail activity is localized with

2. The Quechee Analysis

many of the village centers containing most of this development, like small general stores, town offices, post offices, schools, and cemeteries.

In general, residential development is very low density, scattered amongst farm fields and roadside clearings. The 2008 estimated population for the Town of Lowell was 711, with a population density of only 12.69 people per square mile. This compares to the 10-mile average of about 37.38 people per square mile and the state average of 67.12 people per square mile. The only areas of somewhat concentrated density include Lake Eden, Lowell Village, and Albany Village. Eden pond features a number of camps and homes along the water's edge. In Lowell Village, some homes are concentrated in the vicinity of the intersection of Route 100 and Route 58. Albany Village has residential development concentrated along a stretch of Route 14, with some additional homes off of New Street and Bailey Hazen Road. The total number of residential units in the 10-mile study radius is about 4,705, which equates to roughly 12.46 homes per square mile. The nearest year-round, single-family residences to the Project include (approximately):⁵

- To the east: 3,540 feet (.67 miles) from the closest turbine
- To the west (in Eden): 5,689 feet (1.1 miles) from the nearest turbine
- To the south (in Eden): 13,100 feet (2.5 miles) from the nearest turbine
- To the north: 6,525 feet (1.2 miles) from the nearest turbine

There are many seasonal camps scattered throughout this area as well, the nearest of which is 3,260 feet (.6 mile) from the closest turbine. Most of these are occupied for limited periods of time, primarily for hunting.

This area of the Green Mountains is most distinguished for outdoor activities like snowmobiling, hunting, bicycling and hiking (see *Appendix 4. Cultural Resources Map*). Hunting and snowmobiling are perhaps the most popular activity in these parts, in which there is an extensive network of snowmobiling trails maintained by the Vermont Association of Snow Travelers (VAST). Cross-country skiing is also prevalent, with the Catamount Trail running just north of the Lowell ridge. For warmer weather activities, there are several bicycling routes featured in this area. The Northeastern Vermont Development Association publishes a guide called "Cycling the Kingdom's Back Roads," which highlights bike routes, resources, and other information. The region's deep lakes and rivers are also famous for the excellent and diverse fishing opportunities they offer as well as boating activities. In the study area alone, there are over 10 publicly maintained fishing and boating access areas, with countless other public and private locations.

⁵ Distances are approximate and were determined using ArcMap GIS software and GIS data available at the time from VCGI (e911 esite) and VERA (turbine locations).

2. The Quechee Analysis

The geographic nature of the area displays some other unique features that attract visitors near and far. The oldest long-distance hiking trail in the United States, the Long Trail, cuts through the western edge of the study area and over the summit of Belvidere Mountain, which is located over 6 miles away from the Project site. The Hazen's Notch Association also maintains a network of 15 miles of trails and woods roads for hiking in summer and fall, which are part of a larger network of 40 miles of trails that are maintained in winter for cross-country skiing and snowshoeing in the Hazen's Notch/Jay area. Several other trail systems can be found in the area's public parks and forests as well as private outdoor centers. Additional public investments found within the 10-mile radius of the Project site include: Long Trail State Forest, Hazen's Notch State Park, Green River Reservoir State Park, Lowell Municipal Forest, and Wild Branch Wildlife Management Area. Other local recreational land uses, such as sports fields, playgrounds, parks, and village greens, are scattered throughout the area.

Compared to other regions of the state, this area has a minor road network and traffic volumes remain relatively low. The area's primary roads include Route 100, which parallels the Lowell Mountain range to the west through the town of Lowell, Route 14, which parallels the mountain range to the east through the town of Albany, and Route 58 to the north, which climbs up over the mountain range connecting the east and west sides of the ridge. Much of these roads are set within the surrounding valleys, trees, and vegetation, which limits views of the Project's ridge and provides few longer distance views of the regional landscape. Figure 2 on the following page provides a sampling of land cover and land use activities in the vicinity of Lowell Mountain.

2. The Quechee Analysis

2. The Quechee Analysis

A Sampling of Photos of Project Environs

The following photographs reflect existing conditions and views in the Project area.⁶ Additional photographs are provided in Appendix 5.



Forest cover along the Lowell ridgeline



Looking south from a portion of the Project site

⁶ These photographs were taken with a Canon Powershot Digital Camera with varying focal lengths and are not intended to be used for photographic simulation purposes.

2. The Quechee Analysis



Cheney Road in Lowell looking east toward Project site.



A residence on Irish Hill Road in Lowell situated at the base of the Lowell Mountains near the Project site.

2. The Quechee Analysis



Bayley Hazen Road in Albany looking west at Project site.



New Road near the intersection of the Albany and Lowell town lines shows open views of the Lowell Mountain range.

2. The Quechee Analysis



Looking at Project site from a break in roadside vegetation along the road through the Wild Branch Wildlife Management Area in Eden.



The Public Boat Launch on Lake Eden is located near the base of the southern end of the Lowell Mountains.

2. The Quechee Analysis

2.1.B Is the Project's design compatible with its surroundings?

It is important to note that the review of wind farms within the provisions of the Quechee Analysis is a challenge insofar as the original Quechee Lakes Decision and the numerous Environmental Board cases applying it, did not necessarily anticipate utility scale wind farms. There needs to be a level of flexibility with regard to siting these types of projects due to their specific requirements with regard to effectively “capturing” the wind resource. Thus, wind energy projects of this scale are typically sited on higher elevations where the wind is more prevalent and consistent. The Quechee Analysis deals in part with the question of “fit”, as defined by visual consistency or “sameness.” Wind turbines are not visually the same as the surroundings they are typically located in. Quechee also rests heavily on a project's visibility, and because wind energy projects are sited on higher elevations, and above the treeline in order to generate sufficient power for the projects to be viable, they are not readily screened – they will be visible to a certain extent. Therefore, it can be concluded that wind energy generation and its associated structures will not be hidden within the treeline and screened by surrounding elements. Wind turbines will not necessarily be incompatible with their surroundings, but do and will present a form different than their surroundings, insofar as that form will be above the treeline and silhouetted to the viewer when observed from vantage points where such projects may be visible.

It is also important to consider that the Vermont landscape has always evolved in terms of land use patterns, structures, energy generation and settlement dynamics. It is commonly known that at one point in the state's history a good portion of the landscape was cleared from logging activity to provide charcoal and cordwood for heating, sawlogs for building material, and to support agricultural enterprises such as sheep farming. In fact, George Perkins Marsh's landmark book *Man and Nature*, published in 1864, was a response in part to the widespread deforestation of the hills around his home in Woodstock, Vermont. In that era, Vermont's landscape had as much open, cleared land as there is forestland today. Correspondingly, the open lands without forestation today are similar in acreage to the remnant forests of that era - what was left of the forest in that era.

When modern day metal silos were introduced into Vermont they represented a change in the landscape, and the establishment of the Interstates in the 1960's in Vermont also fomented increased development throughout the state. The development of the modern day ski resorts in Vermont also resulted in a new visual pattern in the state with linear strips of forest cleared from the once wooded slopes to create the ski trails, which now have become an accepted part of our cultural and recreational landscape. Dams for hydropower were also developed as part of certain eras in Vermont's industrial and energy history. Thus, other sources of local energy,

2. The Quechee Analysis

from biomass to solar energy farms and wind, are emerging as important elements in Vermont's energy future. Likewise, the Vermont landscape continues to be in transition, and the evolution of that landscape will include new forms of energy generation facilities and the corresponding physical attributes of such development. Wind energy and the turbines, collector lines and access roads are the physical attributes of wind power, and the national and local landscape has begun to evolve to the point where these facilities are becoming commonplace, and a commonly accepted development pattern in our landscape.

The proposed wind turbines and associated elements of the Project are consistent with some elements of the fitness test:

1) The proposed turbines are positioned in a fashion that reflects the linear nature of the Lowell Mountain Ridge. Their placement is in a consistent, regular manner along the height of land - a broad ridge which is readily compatible for wind turbine siting given the relatively easy access, and the lack of distinct or incompatible landforms such as steep cliff faces or bands, narrow ridge areas, and above treeline or exposed, open areas.

2) The form and off-white or grey color of the turbines is such that they will be less visible than other structures located on mountaintops. This color choice reduces visibility as the light color of the turbines makes them appear less distinct (and, thus less visible) against the background sky of the northeastern Vermont environment, which is often light blue to white/grey with cloud cover. The towers that support the nacelle, nose cone and rotors, taper typically from about 14 feet at the bottom to about 10 feet at the top. The rotor blades also taper and have a very thin cross section, which reduces their profile and distinct visibility beyond 6 miles. A number of steps have been taken in the design and layout of the Project to enhance Project compatibility with its surroundings and facilitate a better "fit" with such surroundings. These steps will be addressed in detail in Section 2.2.C of this report.

Access road and collector lines

The access road and collector lines have been sited and designed in a manner to minimize their environmental and visual impact. This has been accomplished via careful routing and alignment so as to limit overall length, its presence in the landscape, the required clearing and also through the use of single pole structures with compact Hendrix design configurations. The road and collector line corridor are co-located where possible and respond to the terrain and contours rather than fighting them, facilitating a better fit with the landscape.

Distribution and transmission lines and logging roads are present throughout the Vermont environment, and while not necessarily embraced as desirable elements,

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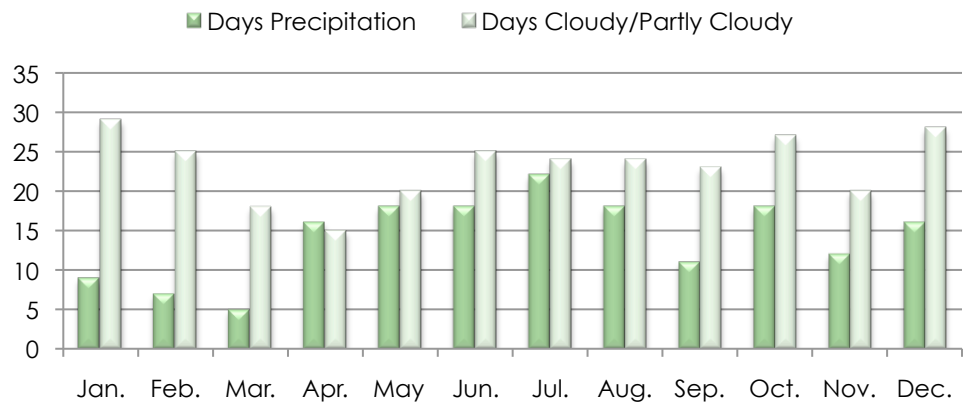
they represent the realities of providing energy to the public as well as being necessary (logging roads) to facilitate resource use and management. These facilities are similar in form and function to these typical development elements already in use in the Northeast Kingdom landscape.

Further considerations with regard to compatibility include the role of weather in visibility, the impacts of shadow flicker and noise, and the upgrade of the transmission line and substations serving the Project.

Weather and climate

The environment of the Northeast Kingdom has a climate, which includes an extensive number of days with clouds and precipitation. Recent compilations of weather data by the National Weather Service indicate that in Morrisville, VT (~20 miles from Lowell) for the month of February 2009 there were 25 days with partly cloudy to cloudy cover and 24 in August 2009.⁷ The total number of days with partly cloudy to cloudy cover in 2009 equaled 278. Precipitation also affects visibility. In Eden, VT (~10 miles from Lowell) for the month of February 2009 there were 15 days with precipitation and 17 in August 2009. The total number of days with precipitation in Eden, VT in 2009 equaled 181. The accompanying graphs (Figures 3 & 4) provide a sense of relevant weather conditions.

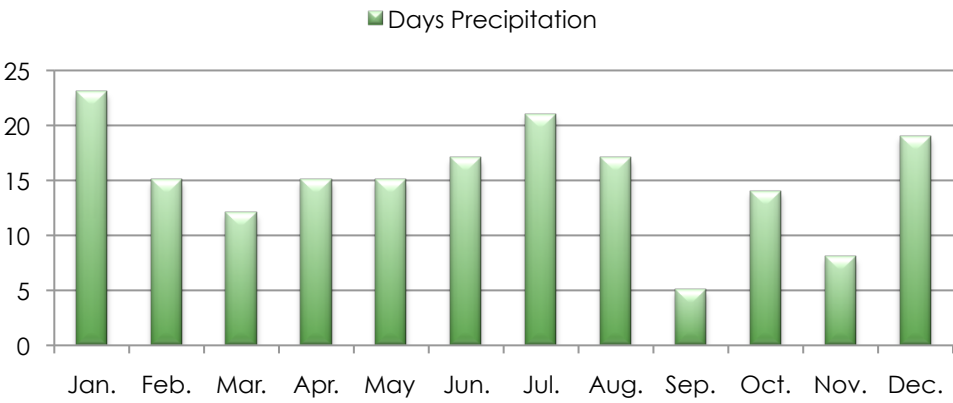
Figure 3. Precipitation for Morrisville, VT, 2009



⁷ National Weather Service Forecast Office: Burlington, VT. Observed Weather Reports, accessed 1/12/09. <http://www.weather.gov/climate/index.php?wfo=btv>

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Figure 4. Precipitation for Eden, VT, 2009



Contrast this with conditions that may affect the visual impact and visual qualities of another well known large scale wind energy project - the San Gorginio Pass Wind Farm outside of Palm Springs, California. Not only is this project highly visible due to the lack of vegetative cover and intervening topography (situated on a broad plateau outside of the city), but there are only 13 days with any precipitation and 39 days with either cloudy or partly cloudy conditions *for the entire year*. This project is much more visible and omnipresent than the Lowell Project will ever be.



Panorama of San Gorginio Pass Wind Farm in California

These weather conditions reduce overall visibility and the presence of the turbines in the landscape, therefore increasing compatibility with surroundings insofar as the Project will not be readily visible or have visual impacts under such conditions. As has been noted with previous projects, and as can be observed when visiting projects already in place, fair weather days with bright white clouds also visually absorb turbines, as they will readily blend into the background clouds often seen behind the turbines when viewed from lower elevations.

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Note that the industry standard publication in the field of visual assessment, *Visual Simulation*, states “There may be marked changes in project appearance with different *viewing conditions* (for example, lighting, weather, season, project age).”⁸ (author’s italics)

Shadow flicker and noise

Mr. Kaliski of Resource Systems Group is addressing noise impacts elsewhere in the Petitioners’ application. Mr. Kaliski addresses the noise levels for the Project and their relationship to current noise levels and overall background noise.

Based on the testimony of Mr. Zimmerman, shadow flicker will only occur 10 hours per year. Mr. Zimmerman cites the fact that the intensity of the shadow flicker diminishes over distance, and beyond 2000 meters (6562 feet), the frequency of shadow flicker occurrences is low. It is also important to note that shadow flicker will be mitigated by the lack of receptors near to the Project. The closest residential structures to the Project are a seasonal camp at .6 miles to the closest turbine and a year round single-family residence at .67 miles. Based on E-911 data, there are 6 year round residential structures within 1-mile distance from the Project, 5 of them located on Eden Road. Of these residential structures, only the Nelson Farm .9 mile away on Bayley Hazen Road is out in the open in a non-wooded environment. Shadow flicker impacts typically occur within .5 to .6 of mile from the turbine locations when there is no vegetation present to mitigate such effects. When vegetation is present, as is the case for the most part in the area near to the Project, shadow flicker impacts are greatly reduced, if not eliminated.

The transmission line upgrade and associated substations

The Project will result in the upgrade or construction of approximately 13.2 miles of 46kV transmission lines in order to carry the additional power load generated by the Project. Additionally, one new stepup substation will be developed along with the upgrade of two substations. The description of this component of the Project is provided in the first section of this assessment.

Distribution lines and transmission lines are not necessarily compatible with the landscape when introduced as new elements within that landscape. Nonetheless, both distribution lines and transmission lines are integral components of the everyday landscape, and as such, we have become accustomed to their presence, if even if they are not particularly harmonious with the surrounding landscape.

In the case of the proposed transmission line upgrade, compatibility does exist insofar as there already exist distribution and transmission lines along this corridor,

⁸ p. 67 in *Visual Simulation* Stephen R.J. Sheppard, Van Nostrand Reinhold, New York, 1989.

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which will be replaced by this proposed upgrade (see *Appendix 6A&B. Visual Simulation of Proposed Transmission Lines*). New poles and compact design of the structures, along with collocation of other utilities, including local distribution lines and electrical service takeoffs, will improve the appearance of the utility corridor and the associated elements. Therefore, this aspect of the Project will be compatible with what is already in place.

For the most part, the transmission corridor will be roadside and/or follow the existing utility corridor when it shifts off road, behind roadside properties and buildings. However, the loss of some vegetation in some limited areas coupled with the increased height of the structures, some shifting of the actual corridor and the development of new substations, will result in changes which, taken together, will result in adverse impact from this aspect of the Project. Note that the substation locations are proposed for locations where utility infrastructure already exists.

As explained in Section 2.2, the Project, if constructed, will not result in an undue adverse impact to the aesthetics and scenic beauty of the area.

2.1.C Are the colors and materials selected for the Project suitable for the context within which it is located?

The Project's primary colors and materials will be those associated with the turbines themselves, the structures used for the collector lines and transmission lines, and the components of the substation. The turbines will be of a light grey or white color allowing them to blend readily into the background of the sky color, which for 278 out of 365 days, or over 75% of the time, is either overcast or partly cloudy - typically resulting in a white, light or grey colored sky. The collector lines and transmission line structures will be wood poles that typically weather to a light brown color, which will be generally less obtrusive, particularly when viewed along the roadside - and are seen throughout Vermont. The substations are typically comprised primarily of metal components, which are of a non-reflective light grey metallic color that tends to be less prominent and visible in the landscape. The substations also have surrounding fencing, which is typically of a chain-link design and constructed out of galvanized steel that weathers to a dull finish similar to the substation components.

These colors and materials are suitable as they represent typical colors and materials associated with these facilities. They are suitable for this context insofar as they represent standard materials and colors used in other similar contexts throughout Vermont.

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2.1.D What is the Project's impact on open space?

The portion of the Project with the turbines and associated elements (collector line, access road and mountainside substation) is being constructed entirely on private land, using existing roads and clearings, where available, and creating only a modest amount of new roads and clearings. Thus, there is no appreciable impact on or loss of open space with a project of this nature. All the uses traditionally associated with the existing open space of the Project context can continue, whether it is timber harvesting, hunting, or recreational travel. Likewise, there will be no impact to any public open spaces, as this portion of the Project will be built entirely on private lands. It neither adds to nor reduces available public open space in the Town of Lowell and surrounding communities.

The portion of the Project associated with the transmission line and upgrade would not result in a reduction in open space. This area is already a utility corridor and does not appear to support any recreational activities. The proposed substation upgrades in Lowell and Jay would essentially fall within the existing substation yard footprints, and thus would not consume additional open space. The proposed relocation of transmission/distribution lines to be roadside through much of the Project will actually improve open space conditions where the lines currently run through farm fields and forests.

Additionally, the Project and all its components, if constructed, will not significantly alter the public's enjoyment of existing public open spaces nor will it in any way limit public access to and use of those open spaces within the ten-mile viewshed.

2.1.E Where is the Project visible from?

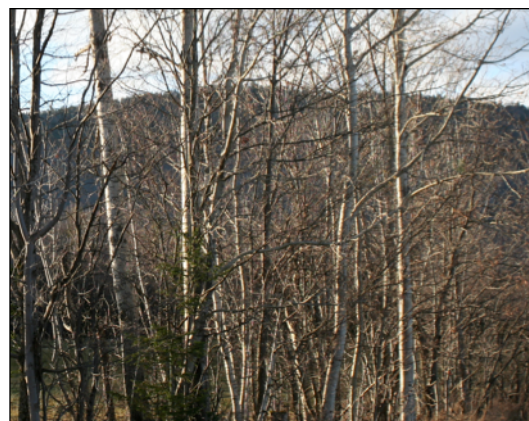
This section addresses the overall Project visibility and assesses the visual impacts that may result if the Project is built. Table 1. Project Visibility Facts provides a quantitative listing of the area of Project visibility and the percentage of the viewshed from which the Project may be seen. This table, Table 2, and the Visual Simulations outlined below, coupled with extensive field review, provided the basis for this section of the assessment. The visual simulations created and used for this assessment, and contained in the Appendix of this report, include:

- Appendix 9A. Visual Simulation From Route 100, Westfield
- Appendix 9B. Visual Simulation From Belvidere Mountain Fire Tower, Lowell
- Appendix 9C. Visual Simulation From Route 58, Lowell
- Appendix 9D. Visual Simulation From Bayley Hazen Road, Lowell/Albany Town Line
- Appendix 9E. Visual Simulation From Albany Center
- Appendix 9F. Visual Simulation From Lowell Elementary School

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Table 1. PROJECT VISIBILITY FACTS			
	Area	Percent of study area	Percent of viewshed
Total study area (10-mile radius of all turbines)	378 sq. mi.	--	--
Total potential viewshed within study area	166 sq. mi.	44%	--
Potential visibility from open areas within 10-mile radius (see Appendix 3)	20 sq. mi.	5%	12%
Potential visibility from forested areas within 10-mile radius	146 sq. mi.	39%	88%
Total area of open water within study area	5 sq. mi.	1%	--
Potential visibility from open water within 10-mile radius	0.9 sq. mi.	0.2%	0.5%
	Distance	Percent	
Total miles of public road within study area	531 mi.	--	
Total miles of road traveled within study area (see Appendix 7)	188 mi.	35%	
Total miles of road traveled where ridgeline is visible	29 mi.	15%	

The overall visibility of this Project is very limited. The potential viewshed of the turbines from open areas represents only 20 square miles or 5% of the total study area. It is important to reaffirm that the topography of this area and the extensive vegetative cover combine to significantly limit the visual accessibility of these turbines. A total of 80% of the Project area within the 10-mile radius is wooded. This factor alone limits visibility. Even with the leaves off the trees, viewing the slender forms of turbines and blades some distance away through even a line of maples is very difficult, and the branch density effectively screens the view. Branch density of deciduous trees can coalesce to create a solid screen even over a viewing distance of 50 to 100 yards (see photo at right). Also, as stated previously, the alignment and orientation of roads, and the location of many of



Visibility is limited even through one small cluster of hardwood trees. Visibility would be even more limited or not possible in denser growth or in stands of evergreens.

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the villages within valley areas or draws combine to limit extensive or prolonged views of the Project site. The dispersed population, low density of the settlement pattern, and lack of popular destinations and tourism attractions limit the number of viewers as well.

The photographs that are included in this report (see *Appendix 5. Photographic Inventory*) provide a representative group of views in and around the proposed Project site, as well as examples of characteristic landscapes and land uses within the 10-mile radius. Table 2 below provides a comprehensive assessment of Project visibility from public vantage points and public investments within the 10-mile radius, as well as *Appendix 7. View from the Road*, which underlines the limited visibility of this Project. In terms of public roads, most of the major roads in the area have limited if any views of the turbine sites. This speaks to the viability of the sites selected for the Project as a location with extremely limited visual impact.

Table 2. MATRIX OF VIEWPOINTS FROM PUBLIC AREAS WITHIN THE 10-MILE RADIUS					
Location	Approximate Distance to Nearest Turbine (mi.)	Not Visible	Visible	Glimpse or Limited Visibility	NOTES
Covered Bridges					
Lords Creek Covered Bridge, Irasburg	7.66	●			
Orne Covered Bridge, Irasburg	9.14	●			
Public Recreation Sites					
Albany Ball Park, Albany	2.36	●			
Albany Municipal Forest, Albany	7.18	●			
Belvidere Mountain Fire Tower, Lowell	5.86		●		Part of 360° view of surrounding lowlands at the summit of Belvidere Mountain. (see page 36)
Craftsbury Common/Dean Johnson Memorial Park, Craftsbury	6.36			●	Intervening structures create limited view through trees in winter. Summer visibility limited to none.

Aesthetic Assessment of the Proposed Kingdom Community Wind Project

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Location	Approximate Distance to Nearest Turbine (mi.)	Not Visible	Visible	Glimpse or Limited Visibility	NOTES
Craftsbury Outdoor Center, Craftsbury	5.36			●	Views are not open – vegetation, topography, and structures limit views.
Eden Lake Recreation Area, Eden	3.22		●		This location is oriented away from the Project site and will not have direct views. (see page 29)
Gelo Park, Lowell	3.30			●	Project views are screened by intervening vegetation.
Irasburg Town Common, Irasburg	6.71			●	Intervening buildings and trees. Not “open” visibility
Lowell Common, Lowell	2.88			●	Dense intervening vegetation / Project visible down Route 100 Corridor
Lowell Municipal Forest, Lowell	.96	●			
Newport Town Forest, Newport	5.34			●	Mostly wooded and limited accessibility. Potential visibility of portions of 1 to 5 turbines in cleared areas.
Tillotson Camp, Lowell	6.93			●	Existing view window will take in only southernmost portion of Project (see page 39)
Westfield Municipal Forest, Westfield	9.43	●			

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Table 2. MATRIX OF VIEWPOINTS FROM PUBLIC AREAS WITHIN THE 10-MILE RADIUS

Location	Approximate Distance to Nearest Turbine (mi.)	Not Visible	Visible	Glimpse or Limited Visibility	NOTES
Westfield Village Center, Westfield	8.48			●	Intervening buildings, long distance views
Unique Natural Features					
Devil's Gap, Eden	5.07	●			
Eden Notch, Eden	1.24	●			
Hazen's Notch, Westfield	7.37	●			(see page 33)
State Parks and State Conserved Land					
Green River Reservoir State Park, Hyde Park and Eden	4.90	●			(see page 40)
Hazen's Notch State Park (closest point), Westfield	6.72	●			
Long Trail State Forest, Eden, Lowell and Westfield (closest point)	5.56	●			Areas of higher elevation may allow glimpses through trees.
Wild Branch Wildlife Management Area, Eden (closest point)	1.03			●	Not visible through majority of area due to dense intervening vegetation. (see page 43)
Wolcott Research Forest (closest point), Wolcott	9.32	●			
Vermont Fish and Wildlife Access Areas/Public Access Areas					
Baker Pond F&W Access, Barton	8.64	●			
Belvidere Pond (closest point), Eden	7.81	●			
Daniels Pond F&W Access, Glover	9.74	●			
Eligo Pond F&W Access, Greensboro	9.88	●			

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Table 2. MATRIX OF VIEWPOINTS FROM PUBLIC AREAS WITHIN THE 10-MILE RADIUS					
Location	Approximate Distance to Nearest Turbine (mi.)	Not Visible	Visible	Glimpse or Limited Visibility	NOTES
Great Hosmer Pond AA, Albany	5.08	●			(see page 41)
Green River Reservoir F&W Access, Hyde Park	8.68	●			(see page 40)
Lake Eden AA, Eden	2.49	●			(see page 29)
Little Hosmer Dam, Craftsbury	5.65		●		Views of some turbines from a distance greater than 5 miles (see page 41)
Parker Pond F&W Access, Glover	9.12	●			

In addition to the resources described in Table 2 above, a number of public viewing points in the 10-mile radius have been field checked and are addressed here in narrative form. These include Lake Eden, Bayley Hazen Road, Route 58, Route 100, Route 14, Hazens Notch Road, the Long Trail, Belvidere Mountain fire tower, Tillotson Camp, Green River Reservoir, Great Hosmer and Little Hosmer Ponds, Wild Branch Wildlife Management Area and the Black River.

Lake Eden

The viewshed mapping and on-site reconnaissance yield the conclusion that the Project will be minimally visible from either the shore or the surface waters of Lake Eden. Additionally, there will be the potential to see portions of between 1 and 10 turbines from the Lake Eden Camp Historic District, but the turbines will be located approximately 3.7 miles from the Camp District, and with only portions of the turbines visible, the visual impact will be negligible. See Appendix 8 for line of sight sections from Lake Eden, which demonstrates that the Project will not be visible from the Dept. of Fish and Wildlife Boat Launch at the northern end of the Lake, and only limited visibility of the rotors of the southernmost turbine from the Lake Eden Camp

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Historic District. Note that line of sight sections are the most reliable way in which to test Project visibility from any one vantage point.⁹



View towards the Project site from the Fish & Wildlife Boat Launch. The turbines will not be visible from here.

Bayley Hazen Road

For a short portion of the original Bayley Hazen Road traveling from Albany to Lowell (where it joins Irish Hill Road), there will be some sections where the Project will be visible. It is not readily apparent that this historic route, which is celebrated as a Revolutionary War era military road, is valued for its scenic qualities as much as it traces an historic travel route with some remnant historic features such as gravesites and markers. It is recommended more for bicycling than vehicular travel, and in fact, most of the Bayley Hazen Road in Lowell, particularly as it ascends the northern end of Lowell Mountain, is not readily passable in summer or winter and is more oriented to mountain biking, backcountry skiing and recreational vehicle use. It should be noted that the travel guide for those interested in following the road, as presented on the Northeastern Vermont Development Association website

⁹ The publication entitled *Visual Simulation* (Stephen R.J. Sheppard, Van Nostrand Reinhold, New York 1989) is considered to be the original and most accepted text on visual assessment through the use of visual simulations and other methods. The author on page 136 states: "the use of accurately drawn cross sections through topography, trees and buildings ...can reveal how much of a structure would be screened from view. Such line-of-sight-profiles can resolve questions of accuracy..."

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(www.nvda.net), doesn't even include this section in its guide - it routes travelers to the east of Albany Village to Rte 14 in Irasburg and around to the north on Rte 58 to Irish Hill Road in Lowell. That is primarily because the road is not readily passable over Lowell Mountain in the summer for passenger cars, and it is not plowed in the winter months.

In Albany, and on the east side of Lowell Mountain, the primary orientation for travelers is to the long views to the east, and only short portions, totaling less than a mile, will have views of a portion of the Project. This road is used in the summer primarily by mountain bikers and ATV enthusiasts. In winter the route is used by snowmobilers and some cross country skiers, as it is part of the Catamount Trail. These are indications that this portion of the trail most likely has a low volume of use. Those using motorized recreational vehicles are seeking a different recreational experience that focuses on the thrill and challenges of the riding itself and the immediate context of the route, rather than seeking out scenery or scenic views as the primary activity of their recreation. The presence of the Project and its intermittent visibility will not substantially affect or alter this experience.

The portions of the road that are followed on existing roads and highways within the viewshed will have limited and intermittent visibility and these sections, where applicable, are identified in *Appendix 7. View from the Road Map*.



Viewing east in the direction of the Lowell Mountains from the start of the Bayley Hazen Road in Lowell.

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Route 58 between Route 100 and Route 14

This portion of the east/west oriented route is considered “perhaps the most scenic road in Lowell,” as stated in the 2009 Lowell Town Plan, which further states, “Route 58...passes over the ridge that forms the northern end of the Lowell Mountains and therefore provides many scenic vistas to the west and north.” This route does indeed provide outstanding views along its higher elevations, but the traveler’s attention is focused towards Jay Peak and Sugarloaf Mountain, and away from Lowell Mountain. In fact, for most areas along Route 58, the slopes of Lowell Mountain are so broad and long that travelers will be unable to see the ridgeline and main spine. Additionally, for the eastern half of Route 58 through Irasburg, views of Lowell Mountain are completely blocked by an intervening unnamed hill. As you approach the village of Irasburg, limited views and glimpses are possible, but will be in the background at a distance greater than 6 miles.



One of the few areas along Route 58 where portions of the Lowell Mountains are visible behind the intervening ridgeline.

There are two main travel corridors running north/south through the Study Area on either side of the Lowell Mountains: Route 100 and Route 14.

Route 100 travels west of the Lowell Mountains through the community centers of Eden, Lowell, Westfield and Troy. The route is notable for its topography, including striking views of Belvidere Mountain, Mount Norris, Haystack Mountain, and further north to Jay Peak and its neighbors, the Canadian Appalachians. The road is

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located in close proximity to many of these peaks, and travelers are primarily looking west towards these mountains while traveling, away from the Lowell Mountains. Other typical landscape features include open fields and meadows, agricultural and small business operations, restaurants, schools, and private residences, primarily located near town centers.

Due to the open landscape in the Westfield region, it is the location of the longest stretches of Project visibility along Route 100 (see *Appendix 7. View from the Road*). A visual simulation was prepared to provide a sense of what potential views from this area may look like and is included in this report (see *Appendix 9A. Visual Simulation from Route 100 in Westfield*). The remaining length of Route 100 contains brief views and glimpses of the Project, most notably near the intersections of Route 100 and Route 58 in Lowell and Route 100 and Route 118 in Eden.

Route 14 is an alternative north/south route for travelers in the region, running along the eastern side of the Lowell Mountains through the communities of Coventry, Irasburg, Albany, Craftsbury, and Greensboro. Land uses along this route are primarily rural residential and contain pastoral landscapes, working farmlands, and areas of dense roadside vegetation. The highway is frequently used for logging operations and by tractor-trailers hauling supplies through the region. Project visibility along Route 14 is most evident on a stretch of road just south of Irasburg Common and along a stretch in Craftsbury just west of the village. Areas north of Irasburg will have very limited or no views due to topography and intervening vegetation and structures.

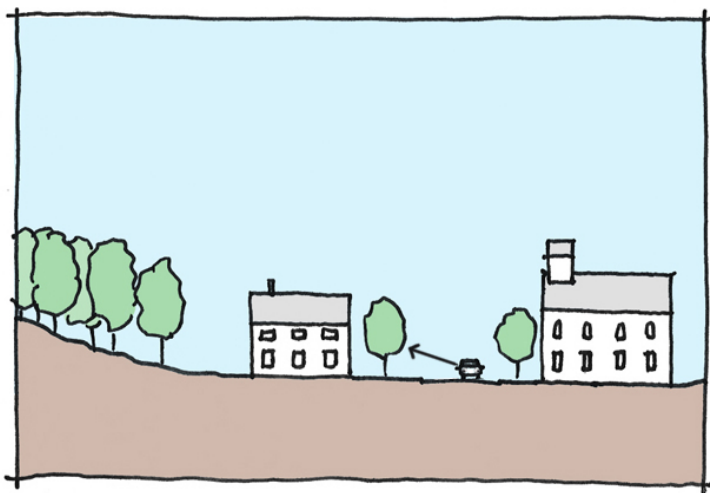


Figure 5. In villages such as Irasburg and Craftsbury, the tight clustering of residences and structures will block westerly views to the Project.

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Hazen's Notch Road from Montgomery Center to Lowell Village

Hazen's Notch Road extends 10.4 miles northwest/southeast from Montgomery Center, through a small portion of Westfield, and into the Village of Lowell. The Project will not be visible along 90% of the road, and will not come into view until travelers enter into Lowell at about 7 miles from Montgomery Center. Much of the road is heavily forested, particularly through the Hazen's Notch State Park, where a section of the road is closed in the winter. The Long Trail crosses the road at Hazen's Notch, which is defined by the cliffs of Sugarloaf Mountain to the north and by Haystack Mountain to the south. Again, the Project will not be visible from this notable feature. Glimpses become possible approximately 1.5 miles after you pass through Hazen's Notch and start descending in elevation. A section of Hazen's Notch Road near the intersection of Buck Hill Road does have open views of the northern end of the Lowell Mountain Range for a stretch of about 0.6 mile. As one continues east along the road, and further descends in altitude, the view disappears behind an intervening ridgeline. Glimpses of the Project area are likely again once one approaches Lowell Village, but will be filtered through roadside vegetation, buildings and structures.



Picture taken just east of where the Long Trail crosses Hazen's Notch Road

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The Long Trail

Portions of the Long Trail were evaluated for potential visual impacts that might result from this Project. Two sites in particular, where the Project will be most visible to hikers, were studied in detail: Belvidere Mountain and Tillotson Camp.

It has been concluded that there are only 2 locations along the Long Trail viewshed, both over 5 miles in distance from the Project, where complete or partial visibility of the Project will be evident: from the summit of Belvidere Mountain (0.2 of a mile on a spur from the Long Trail) and Tillotson Camp. This is due to the fact that most of the Long Trail in this section (and within the ten mile viewshed) travels through a heavily wooded corridor. For example, the entire climb up from the south trailhead to Belvidere on Route 109 is within the treeline, and views are only obtained when one departs the Long Trail and takes the spur up to Belvidere Mountain and reaches the summit.

The Green Mountain Club (GMC) oversees the management and use of the Long Trail and has developed specific policies with regard to wind projects and their potential impacts. The policy incorporates provisions of the National Forest Service's *Scenery Management System*. Based on that classification system, this Project will be in the "background zone" of 4.0 miles to the horizon. Thus, there will be no direct impacts to the trail or lands that surround the trail. The only impact will be the visibility of the Project from a limited number of vantage points along the trail.¹⁰ The Green Mountain Club's policy is also referenced in Section 2.2.B of this report.

¹⁰ "Windpower - General Policy" as adopted by the Green Mountain Club in March 2009 and amended in September 2009.

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Long Trail junction 0.2 of a mile below Belvidere Summit



Looking north along continuous forested canopy of the ridge that the Long Trail follows

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Belvidere Mountain

The Project will be visible from the summit of Belvidere Mountain. The distance and conditions are such that the Project will not be a focal point, nor will it dominate the view to the east, which is a very broad view that includes the distinct form and landmark of the Presidential Range of the White Mountains. There is a fire tower open to the public at the summit and most hikers climb the tower for the exceptional 360-degree view (see *Appendix 10A&B. Panoramic View from the Fire Tower*). Many other landmarks and visual elements draw the eye in this view, including the view to Jay Peak and its summit structure and Big Jay to the southwest of Jay Peak, as well as Mt. Mansfield and the high spine of the Green Mountains to the south. The former asbestos mine lies just below the summit vantage point on the eastern slope of Belvidere Mountain. Transmission corridors, roadways, settled areas and other distinct landforms such as Norris Mountain also draw the viewer's attention. Lowell Mountain appears to be below the vantage point on the mountain summit - rather than directly in the line of sight. In fact, the Project as seen from the Fire Tower will appear to be below the horizon line of the landscape backdrop to the east, and will be backgrounded by landforms beyond Lowell Mountain to the east, thereby reducing its prominence and presence in the landscape. See *Appendix 9B. Visual Simulation from Summit of Belvidere Mountain* for evidence supporting this conclusion.

In this simulation from the Fire Tower, one can see that the turbines do not block the view to the east of the White Mountain massif, or any of the entire ridgeline panorama. The apparent scale of the turbines in the view is also a factor to consider as this diminishes the visual dominance of the structures in the landscape. When viewed in this manner, the turbines are approximately 10-12% of the overall vertical height of the mountain (and this relationship varies based on whether or not the rotors are visible and included in this scale relationship) – Figure 9 on page 64 of this report presents the relative height of the turbines to the overall vertical height of the visible mountain.

Several turbines will appear below the view to the White Mountains, and this will result in as an adverse impact affecting the view. The turbines will have a slightly different relationship to the horizon line when viewed from the base of the Fire Tower through a narrow window in the stunted evergreen vegetation of the summit (see photo that follows). One can also see the remnants of the Lowell Asbestos Mine just below this vantage point and thus this is not a pristine view. Indeed, the Long Trail hiker experiences sections of the trail that appear to be quite isolated and within the treeline, and other sections where numerous types of development and land uses are readily visible. It cannot be concluded, therefore, that the Long Trail always offers a true wilderness experience when vantage points such as Belvidere Mountain are encountered. In fact, the presence of the Fire Tower itself dispels that notion.

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View "window" out to former Asbestos mine, Mt. Norris and Lowell Mountains from Belvidere Summit



Close up of Jay Peak and Tram building

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Tillotson Camp

Tillotson camp is a shelter located to the north of Belvidere Mountain in a saddle on the high ridge of the Green Mountains that the Long Trail follows. The shelter is also accessed from Lowell via the Frank Post Trail, which begins at a point along Tillotson Road. Reconnaissance of the area in the vicinity of the camp as well as a review of photography from the Camp provided by the Green Mountain Club yielded some conclusions with regard to overall visual impact of the Project to the Long Trail in this area, as well with regard to Tillotson Camp:

1. Long sections and stretches of the Long Trail in this area are completely wooded, affording little if any views to distant vistas. This is true even in winter (see accompanying photos for typical view of the trail in winter).
2. The orientation of the Frank Post Trail and the shelter in this area is such that the focus is away from Lowell Mountain, and more in the southeasterly (versus due east) direction.
3. The existing view window, as depicted in the photograph from Tillotson Camp itself, is focused also in a southeasterly direction, and thus will only take in the far southernmost portion of the Project with a view of potentially +/- 6 turbines (1/4 of the Project), within that window.

LandWorks prepared an approximate simulation of the KCW Project from Tillotson Camp (see picture that follows). We relied on a fall photograph provided by the Club and did not have exact coordinates for the camp. Nonetheless the simulation provides a reasonable depiction of what the Project will look like from the shelter, which is located along the Long Trail, north of Belvidere Mountain.

Based on our assessment and the simulation, we have concluded that only 4 turbines will be directly visible from Tillotson Camp, with a fifth partially visible in and among tree branches. The turbine will appear quite small at the distance of over 6 miles from the nearest turbine and will only occupy the left hand (northerly) portion of the view, and within an area that will constitute only 15% of the total panorama. Therefore the view of the Project will not overwhelm or dominate the view from this location, or significantly degrade or undermine the view, and will most likely appear as more of a curiosity than a visual intrusion or impact.

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Approximate Simulation of the View from Tillotson Camp of the Kingdom Community Wind Project

Green River Reservoir

Green River Reservoir is located in the 5-10 mile range of the Project study area, in the towns of Eden and Hyde Park. Approximately 5,110 acres of State preserved land surrounds the reservoir, which will remain in its wild and undeveloped condition. The reservoir is designated as a “quiet” lake under Vermont “Use of Public Waters Rules,” which limits powered electric boats to 5 mph. The 653-acre reservoir includes about 19 miles of shoreline, which is one of the longest stretches of undeveloped shoreline in the State. There are 28 remote campsites around the reservoir that can only be reached by boat. The Town of Hyde Park has identified this area as a “unique place with a wilderness character” that should be maintained into the future. The viewshed mapping, 3D modeling and on-site reconnaissance that was conducted yield the conclusion that the Project will not be visible from the 19 miles of shoreline or from the surface waters of the reservoir, nor will it be visible from within the State Park. This lack of visibility (and consequent visual impact) is due primarily to: 1) the location of the reservoir within a lower area topographically with surrounding hillsides and higher ground around its perimeter (i.e. Bean Mountain, McKinstry Hill, Umbrella Mountain and the most southeasterly ridge and

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hilltops associated with Lowell Mountain); and, 2) the intact woodlands which completely surround the Reservoir.



View looking northeast from the Fish & Wildlife Access Area at Green River Reservoir
- Lowell Mountains are not visible

Great Hosmer and Little Hosmer Ponds

Great Hosmer and Little Hosmer Ponds, located in the towns of Craftsbury and Albany, are well known for a variety of outdoor recreational opportunities. Each pond offers easy access and a number of year-round activities, from fishing and boating to cross-country skiing and ice fishing. Great Hosmer Pond is perhaps the more popular of the two neighboring ponds, since it has multiple access points as well as being home to the Craftsbury Outdoor Center and the oldest rowing camp in North America. Visibility from this pond is nearly nonexistent due to heavy shoreline vegetation and intervening topography and ridgelines. According to the viewshed map, there may be some potential for visibility at the extreme northern and southern tips of the pond, but this will be limited in duration as well as number and extent of turbines visible, and it can be concluded that the Project will not offend viewers from these potential locations.

Little Hosmer Pond, located entirely within Craftsbury, has a VT Fish & Wildlife Access Area at the southern end of the pond. The shoreline of this 183-acre pond is predominately undeveloped with most of the development occurring on the western

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shoreline. Boaters and fishing parties on Little Hosmer Pond will have views of the Project from some vantage points, including the public boat launch at the pond's southernmost end. The pond is scenic and has little development along its shores, and the Project will have the potential for an adverse impact to the aesthetics and scenic quality of this location. However, these views will be of turbines that are more than 5 miles away, diminishing both their scale and dominance in the view. At least half of the pond and most of its shoreline will not be in the viewshed, thus providing options for those who are recreating on the pond to spend time or find locations where they will not see the Project if they wish to do so. Additionally, viewers can choose to boat or fish on other nearby ponds of similar landscape quality and appeal if they do not want to be within the Project viewshed. Based on these considerations it can be concluded that the Project will not offend viewers in this location.



Looking west toward Project Site from Great Hosmer Pond Public Boat Launch, just north of the Craftsbury/Albany townline. The Lowell Mountain ridgeline is not visible.

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Fish & Wildlife Access Area at Little Hosmer Dam – Lowell Mountains are visible in the distant background.

Wild Branch Wildlife Management Area

The Wild Branch Wildlife Management Area (WMA) is located in the town of Eden and is almost completely forested with red and sugar maple, yellow birch and beech. There are small areas of old fields with apple trees and only hunting and trapping are permitted here. The area is accessible by a dirt road, which travels about 0.4 of a mile through the western portion. Although the WMA is located in close proximity to the Lowell Mountain Range, views of the Project will be limited or non-existent due to heavy roadside vegetation. The road is oriented in a north/south direction and thus travelers are not looking straight on at the Project as they move along the road. At areas lacking intervening vegetation, such as the bridge crossing near the northern section of road, the Project Site will be oriented above and to the west of the travelers' view.

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Heavy vegetation along the roadside blocks potential views of the Project from the Wild Branch Wildlife Management Area.

Black River

The Black River meanders slowly for 30 miles, originating in Craftsbury, just east of Great Hosmer Pond, and flows northerly until it eventually enters into Lake Memphremagog. The river passes through the towns of Albany, Irasburg, Coventry, and Newport and is known for abundant wildlife habitats, trout fishing, and unsettled, forested bank. It is paralleled much of the way by Vermont Route 14. Field reconnaissance yields the conclusion that the Project will be minimally visible due to the forested shoreline and intervening topography. Moreover, the river flows northerly, which indicates that most boaters and anglers will be oriented away from the Lowell Mountains for nearly three-quarters of the rivers length.

The Nelson Farm and environs

The primary focus for the Quechee Analysis is the visual assessment of potential Project impacts to public vantage points and public open space, such as parks and recreation facilities. The potential for impacts to private residences do exist but it would be impractical for an analysis to assess those impacts for every private residence within a 10-mile Project viewshed. This analysis does recognize that there will be some residences closer to the Project that will potentially be adversely impacted by the views of the Project.

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There are 6 year round residences located within 1 mile of the Project.¹¹ Of those 6 residences, all of which are located in Lowell, only 1 home is out in the open, the Nelson Farm on Bayley Hazen Road. The closest home is .67 of a mile from the nearest proposed turbine, but this home is sited within a wooded area. Several other homes farther than 1 mile are located along the Bayley Hazen Road and will have direct views of the Project. These homes are oriented away from the Project site and have other qualities associated with them such as intervening elements (utility lines, outbuildings, etc.) that reduce the scenic values in their vicinity.

Wind energy projects, given their requirements to access the wind resource effectively, must be constructed so as to be above their surroundings, and therefore cannot be construed to be completely compatible with those surroundings, if compatibility is based on being able to fit “within” and be hidden or mitigated by the landscape context in a purely physical manner. This wind energy project will be directly visible from the Nelson Farm, and the impact of that visibility, in this instance, is increased due to the proximity of the view and the consequent prominence of the turbines (see *Appendix 9D. Visual Simulation From Bayley Hazen Road, Lowell/Albany Town Line*).

Therefore it can be concluded that there will be an adverse impact to aesthetics in the vicinity of the Nelson Farm and this portion of the Bayley Hazen Military Road. In the instance of the Nelson Farm, it is important to consider that the primary view and orientation of their home is to the views to the east, and not behind to the mountainside. The Project will not affect their ability to use or farm their property. There are no local community standards, which affect the Nelson Farm and will be violated if the Project is built, as discussed in Section 2.2 of this report.

The residence on the farm has historic values and the impact to the historic qualities of the building(s) is addressed in Ms. Pritchett’s Report on Historic Sites and Structures. From a landscape perspective the wind energy Project will not have any deleterious effect on the appreciation or enjoyment of any aspects of the landscape directly associated with the farm as part of the property, nor is there any evidence that the landscape today represents any specific or unique historic attributes which may be associated with an older homestead, or appreciated by or accessible to the public.

Project Lighting

Project lighting is another aspect of visibility that needs to be examined. Turbines will be lit in accordance with Federal Aviation Administration (FAA) review and

¹¹ Distances are approximate and were determined using ArcMap GIS software and GIS data available at the time from VCGI (e911 esite) and VERA (turbine locations).

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regulatory requirements, which typically require lighting on structures over 200 feet. The possible lighting configuration for a project of this nature will include: 1) a light on the highest turbine, 2) a light on the middle turbine of the Project, 3) lights on the turbines at either end of the array, and 4) lighting on turbines at 1/2 mile intervals along the length of the array. Based on these criteria - it is likely that there will be 9 lights positioned among the turbines for night-time aviation safety.

The proposed lighting will consist of an L-864 flashing red beacon at the hub or nacelle of selected turbines - at approximately 279 feet above grade. The report entitled *Development of Obstruction Lighting Standards for Wind Turbine Farms*, prepared in 2005 by James W. Patterson, Jr. for the Federal Aviation Administration states that “although it is outside the confines of lighting standards, studies have suggested that the use red light emitting diode (LED) or rapid discharge style L-864 fixtures are effective in reducing impacts on neighboring communities, as the fixtures’ exposure time is minimal, thus creating less of a nuisance.”

These lights do not direct light of any significant intensity below minus 10 degrees of the horizontal plane created by the direct cast of the light itself, and therefore do not create glare or untoward light impacts to the naked eye situated below the tower base. The red color is less intense and has less contrast than other light colors (typically white or off white). There are no impacts to sky glow or night sky viewing from these types of lights.

These types of lights are a common sight and are visible throughout Vermont on the tops of telecommunication towers, and on radio towers, such as those visible from along Interstate Route 89 in Waterbury. Such lights are not typically seen as obtrusive or visually offensive. They have become accepted elements of our everyday landscape and are necessary for aircraft safety.

Furthermore, viewing at night is limited because individuals typically do not recreate or spend long periods of time outdoors at night. When they are outdoors at night, lights from buildings, street lights or building mounted outdoor lights will appear much more intense and will often preclude visibility of distant lights. Thus, the Project lighting will not be highly visible within the ten-mile viewshed, nor will there be any significant impact on public vantage points or scenic resources.

Project Access Roads and Collector Lines

The focus for Project visibility is primarily the turbines themselves. The turbine array will be the primary project element that most viewers will see and experience. There will be visibility of the access road and collector line from areas west of the Project site, although these areas of visibility are limited due to topography and intervening vegetation, as set forth elsewhere in this assessment in the Potential Visibility map

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and accompanying narrative. Approximately half-way up the access road, a maintenance building, small substation and staging area are proposed. The siting, surrounding vegetation and the location of these facilities in an area that is not as steeply sloped as other portions of the mountain all combine to reduce the visual presence and consequent impact of these elements of the Project.

A number of steps have been taken to reduce potential visibility for these elements, including the undergrounding of the collector lines along the ridge, connecting all of the turbines running from the north end of the Project to the southernmost turbine. The collector line running down the mountain will be within a 100 foot corridor, but the corridor will not be cleared to the full 100 feet in those areas where the existing trees do not constitute danger trees that might fall onto the line and affect its reliability. In addition, lower growing vegetation will be retained wherever possible. This approach will help to avoid the appearance of a straight, linear cut for the line. In addition, this line is co-located in several locations with the access road to reduce the extent of overall clearing required. The clearing and visibility of these elements will be most noticeable in winter, when snow is on the ground. Otherwise the structures and Project elements will be visually less prominent given the background of the landscape and vegetation. Taken together these factors will reduce overall visibility of these elements, but certainly not eliminate it. If viewed from afar, the access road and collector line corridor will not appear to be unusual or unlike anything else that is visible in the Vermont landscape. It is anticipated that a total of 133 acres will need to be cleared to accommodate the proposed access road and collector lines. The additional clearing is required for road and turbine pad construction. The clearing and grading for the turbine sites themselves will not result in extensive visibility or an apparent change to the form and character of the mountaintop. Cuts and fills and consequent tree loss are being minimized through an innovative approach to the design referred to as a Variable Road Location Detail. This method is specifically oriented towards avoiding environmental impacts and mitigating the effects of construction on the existing grade and surrounding landscape.

The roads and clearing will be similar to what is seen on hillsides that are being managed for sawlogs and the forest resource. The electrical line corridor will appear in some sections to be very similar to other such cleared and established corridors, which can be seen all over Vermont on hillsides and in wooded areas. Given the variable road location design approach, and the intent to selectively clear along the electrical connector line corridor, it is difficult to calculate during the pre-construction phase what the exact extent of the required clearing will be. It can be concluded that the concern with clearing is not necessarily how many acres are involved, but what the nature of the clearing will be, how visible it will be, and whether this will result in unacceptable impacts. Extensive analysis of the potential

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visual impact of the clearing activity has yielded the conclusion that the clearing and grading for road construction (for the access road and crane path along the ridge) will result in an adverse impact as it will constitute a change to the mountain that will alter its current character. This alteration will not be so extensive or so highly visible and discordant that it will result in an undue, adverse impact to the scenic beauty and aesthetics of the Project area.

Transmission Line

The proposed transmission line upgrades will be predominantly visible from the roads that parallel the line and from the houses in the vicinity of the line. The transmission line is proposed to run roadside along Route 100 from Lowell to Westfield, so drivers on this stretch of highway would see the new/upgraded line.

In Westfield, in the vicinity of Cemetery Road, the transmission line will generally follow the existing VEC line, which travels through farm fields and woods to the west of Route 100 and North Hill Road. The line will remain visible where it is located in open farm fields, but it will disappear from view in places where it runs through existing woods. As the transmission line would follow the existing VEC line along North Hill Road on its route to the Jay 17 Substation, its visibility from this road is intermittent. In some areas the line is quite close to the road, whereas in others it is set back in the woods. Proposed VEC maintenance clearing will open up views to a greater degree, but the lines would continue to be 'backgrounded' by trees in this heavily wooded area. This area has very little development, but some existing residences would have views of the transmission line upgrade.

From the VEC Jay 17 substation to the proposed VEC Jay Tap switching station, the transmission line will follow along the existing distribution right-of-way east of Cross Road to the existing 46kV line at the intersection of Route 105 and Cross Road. As such, it will follow an already established utility corridor (VEC distribution overhead), which is intermittently visible from the road. The proposed transmission line will thereby travel through a landscape that is characterized by open farm fields and wooded areas, and the line is close to the road in some places and set back somewhat in others. From this point the line will connect to a reconductored VELCO transmission line that runs along Route 105 all the way to the proposed VEC Jay Tap switching station. This line has intermittent visibility from the road due to the fact that Route 105 weaves in and out of this corridor through a landscape that is dominated by forest with some open fields.

Because the majority of the transmission line will be running along the roadside, it will represent a foreground view that recedes into the background when looking straight ahead while driving. When viewing the landscape from a vehicle's side windows, the transmission line poles will be in an intermittent foreground view

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while the lines themselves will often be above the viewer's horizontal cone of vision. Although the poles and lines will be closer than the ones that are being removed from farm fields away from the road, the visual impact of these new lines would likely be less in many cases. The viewer's eye is typically drawn out into the mid-ground and background landscape with its respective aesthetic features- farm fields, barns, water bodies, woodland edges, and ridges. By moving the electrical lines roadside, this portion of the landscape will be free of utility infrastructure visual impacts.

The proposed VEC Lowell substation upgrade will be visible from Route 100, as is the existing substation. It will also be visible from a few residences across from and behind the substation, and at least one business on the opposite side of Route 100 would have visibility. The majority of the existing evergreen screening will be maintained, which greatly buffers views into the site. High traffic speeds (with a 50 mph speed limit) on Route 100 combined with screening results in minimal visual impact when driving.

The proposed VEC Jay 17 substation upgrade will be visible from Cross Road, as is the existing substation. It will also be visible from the Lowell town garage across the road and potentially from one or two businesses at the intersection of Cross Road and Route 242, although their views are not oriented toward the substation. Existing tree screening will be maintained as much as possible, which greatly reduces visibility from the road. This substation site is particularly desirable because it has the feeling of being tucked in the woods.

The proposed VEC Jay Tap switching station (being constructed as a separate project from KCW) will have an associated VELCO step up transformer and 115 kV taps as part of this Project. This location is tucked out of view from Route 105, as it is set lower in elevation and in a heavily wooded area. The only possible views appear to be from the distant Jay Peak ski slopes.

Conclusion

The test for adversity with regard to aesthetics hinges on a number of factors, which emerge from the first step of the Quechee Analysis. There is low threshold for the determination of adverse impacts when this test is applied to a project such as the Kingdom Community Wind Project. As has been stated, it is impossible to screen a project which requires structures to be placed in locations where the wind resource is accessed in a feasible and cost effective way for producing the desired result of the Project: renewable energy for local use. It is also important to recognize (as I believe all Vermonters do) that these locations need to be on ridgelines and hilltops in Vermont; if we are to take responsibility for producing our own power, the impacts associated with that power source will, of necessity be local, rather than elsewhere.

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Thus this Project will have a certain amount of visibility and in some views, and in some instances, when viewed from particular vantage points, the visual impacts associated with an array of turbines along Lowell Mountain will be adverse. These vantage points include locations such as Belvidere Mountain, Little Hosmer Pond, and from portions of the Bayley Hazen Road and other nearby areas in Lowell with open views. Several residential areas, and most notably the one along Bayley Hazen Road, will have direct views of the Project, which will be of sufficient proximity to alter the view in a manner that suggests that this aspect of the Project is not a “fit” visually with its environs. It must be noted, however, that there are other qualities of the Project which do fit the landscape - most importantly, as stated, the location, which needs to be where the wind resource is - and in this regard the Project does indeed fit with the resource characteristics of its landscape.

The Project will constitute a change that will alter both the landscape the Project is developed on and views to that landscape. The overall Project visibility is quite limited however. Table 1. Project Visibility Facts sets this out - for example, only 5% of the entire Project area of 378 square miles (the area within the area delineated by a 10 mile radius from the turbine locations) will have views of the Project from open areas, based on VCGI (Vermont Center for Geographic Information) land cover data. This is a significant consideration as it implies that almost 95% of the Project area **will not** have views of the Project, or if there are views they will be through forest cover, which greatly diminishes visual impact.

The extent of Project visibility and the nature of possible visual impacts from this Project are mitigated and reduced by a number of factors which are presented in this and other sections of the report. These factors include topography, orientation, land cover, yearly weather conditions and the tradition of the working landscape in this region. Nonetheless, the noticeable change in the landscape when the Project is viewed from certain vantage points is sufficient to conclude that the Project will result in an adverse impact to aesthetics and scenic beauty of the area.

2.1.F Overall Conclusion to the First Step of the Quechee Analysis

Based on the foregoing analysis, and the fact that the Project will result in some visual change in the landscape that will be noticeable from certain public vantage points, and will be visible from some areas and locales considered scenic or used by recreational enthusiasts, and will alter some existing conditions within that landscape, this assessment concludes that the Project will have an **adverse** impact to aesthetics and the scenic beauty of the region within the ten mile viewshed. The Project will not, however, result in an undue adverse impact to aesthetics and the scenic beauty of the region, and the basis for that conclusion is presented in the next section of this assessment.

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2.2 The Second Step of the Quechee Analysis

Given that this assessment has concluded that if the Project is constructed there will be the potential for an adverse impact on the aesthetics and scenic beauty of the area, the second step of the Quechee Analysis is triggered. A project may be found to have undue adverse aesthetic impacts if any one of the three following conditions exists. This final step of the Quechee Analysis will address these questions.

2.2.A Does the Project violate a clear written community standard intended to preserve the aesthetics or scenic, natural beauty of the area?

"In order for a provision to be considered a clear, written community standard, it must be 'intended to preserve the aesthetics or scenic beauty of the area' where the proposed project is located and must apply to specific resources in the proposed project area."¹²

In evaluating whether a project violates a clear community standard under the Quechee test, the Board routinely looks to the town plan as the primary document for providing these standards. If the Board finds that such standards do exist, and that the project as designed would violate those standards, the adverse impact would be undue. We reviewed all applicable local and regional plans and compiled pertinent references in *Appendix 11. Excerpts from Town and Regional Plans*. This compilation includes all towns and regional commissions within the 10-mile radius. However, only a review of plans for the town and region the Project is located in is required for this analysis, which includes the Town of Lowell and the Northeastern Vermont Development Association (NVDA). Based on the review of the NVDA Regional Plan and the Lowell Town Plan, it can be concluded that the Project does not violate a clear, community standard intended to preserve the aesthetics or scenic beauty of the area in accordance with the Quechee test.

The **NVDA Regional Plan** became effective on August 4, 2006, and contains several references to energy development, aesthetics, and scenic quality, but none that provide measurable actions or would in effect be mandatory. *Chapter 4 Historic, Cultural and Scenic Resources* (pg. 9) states, "Significant historic, cultural, and scenic resources within the region should be identified and preserved... Assist communities to preserve and maintain... scenic landscapes." These general, overarching goals have no other standards to support or implement them and none of these policies, goals, or strategies specifically deter or prohibit the installation of a new wind facility

¹² In re Halnon, NM-25, Order of 3/15/01 at 22 n.5.

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in Lowell. Rather, they are broad statements that provide general advisory recommendations and guidance to individual municipalities, and are non-compulsory in nature. This reasoning holds true in the policy statement for 2011 Energy Strategies in Chapter Two (pg. 5), which states, “Permitting authorities shall first consider current and historical land use and the culture of the region as well as the land owner’s rights. Any development shall to the extent possible be done so as to mitigate adverse impacts to the region.” Chapter 2 further provides goals that support energy development such as “Provide an adequate, reliable, and secure energy supply to meet the region’s needs” and “Encourage a diversified energy portfolio.” As another relevant energy goal, the plan would like to “Limit the negative aesthetic impacts of power generation and distribution facilities.” However, there are no standards that provide guidance in interpreting any of these goals. In fact, the plan goes on to offer, as one of its strategies, to “Promote the upgrade of regional transmission systems to reduce gateway constraints.” Under the Portfolio Recommendations of Chapter 2, the plan offers the following to be *considered* by the Public Service Board in its review of wind facilities:

- 1) The consistency of the proposal with not only the region’s plan and the host town’s plan and zoning bylaws, but also the plans and bylaws of other towns which may be impacted by the proposed project.*
- 2) A weighing of the potential benefits as well as negative impacts on not only the host town but other impacted towns, including a possible outline of tax payment benefits to impacted towns.*
- 3) Applicants must include a comprehensive de-commissioning plan when filing for a Certificate of Public Good.*
- 4) Appearance and operation of facilities should be weighed as an aspect to change the essential character of the area.*
- 5) Proposed turbines should be sited to minimize the visual impacts.*

However, these are only suggestions to be considered by the PSB, and are not mandatory standards. Moreover, the plan even states that differing towns may take different positions on wind power, and that the only compliance necessary is that each town *considers* wind energy. Thus, if a town supports wind energy development in its town plan, or does not prohibit it, then the Project would be in compliance in accordance with the town plan, and therefore the Regional Plan.

These statements reflect overriding goals, policies and recommendations, which are characteristically advisory and non-compulsory in nature. The statements use terms of “encourage,” “support,” “promote,” and “should.” As was concluded by the Board in previous decisions related to wind standards that are focused on broader

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issues, which affect the region as a “whole,” and typically do not address the specific area in which the Project will be located are insufficient.¹³ Thus, while it is important to consider relevant regional policies in this Quechee analysis, these must be weighed against the independent and more specific standards provided in the local town plans. It is therefore concluded that the Project does not violate an applicable community standard outlined in the NVDA Regional Plan.

The **Town of Lowell** recently readopted its 2003 Town Plan, with no changes, on April 14, 2009. While the Plan contains many references to relevant issues such as scenic beauty and alternative energy, there are no provisions that specifically relate to wind power generation and its affect on aesthetics. In addition, Lowell Mountain is not identified as a predominant scenic feature in town, nor does the Plan specifically prohibit development on the mountain. The Plan begins with a list of its overall goals and objectives, one of which includes “Maintain[ing] the Town's beautiful rural character as much as possible” (pg. 2). Differing land uses throughout the town are then discussed in the section that follows, but there are no standards that define how the “beautiful rural character” must be preserved. There is a section entitled *Scenic Features*, which identifies Route 58 from the top of Lowell Mountain to Hazens’s Notch as “one of the most varied and beautiful six miles in Vermont” and “encourages the establishment of this stretch of road as a scenic corridor” (pg. 20). Spectacular views are broadly characterized for this road, but the resources to be protected are not clearly identified, not even the Lowell Mountain range. Moreover, the Plan does “not prohibit or unduly restrict development on this road” (pg. 9), nor does it specifically protect or preserve the views of the valley and ridgelines. No other areas in town are identified as scenic. The Plan does recommend, “that all land above 2,000 [feet] be designated as being in [the Conservation-Mountain] district” (pg. 5) and that it “should have a very low intensity of development” (pg. 5). However, there are no restrictions identified that explicitly restrict or prohibit development here. In fact, the Plan specifically recommends the development of renewable energy resources, which “would include the use of wood, solar, wind, and hydro energy” (pg. 31), and this is confirmed in the Zoning Bylaw which indisputably identifies “windmills” as a conditional use in the Conservation-Mountain district (pg. 5). Phrases such as “encourage” and “recommend,” indicate non-mandatory language and while they may provide guidance in the interpretation of the Plan and may be used to bolster more specific policies in the Plan, they do not, by themselves, constitute a standard. Thus, the goals and provisions that pertain to aesthetics, which are outlined in the Plan, can not be considered a clear guide for protecting scenic values under Step 2 of the Quechee analysis because they are non-

¹³ *In Re: Deerfield Wind Project*: Docket 7250, Order of 4/16/09 at 62 (“Deerfield”); *In Re: Sheffield Wind Project*: Docket 7156, Order of 8/8/07 at 66 (“Sheffield”).

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mandatory and not specific enough to rise to the level of a “clear, written community standard.”

2.2.B Does the Project offend the sensibilities of the average person? Is the Project, when viewed as a whole, offensive or shocking, because it is out of character with its surroundings, or significantly diminishes the scenic qualities of the area?

A number of considerations inform the review under this provision of the Quechee “Test” and lead to the conclusion that **the Project will not be offensive or shocking or offend the sensibilities of the average person.** These considerations include: 1) the increased development and presence of wind power at both the residential and grid scale in Vermont and in New York and Northern New England; 2) evidence that public opinion is shifting in terms of its awareness, acceptance and understanding of wind energy; 3) the increase in numbers of wind turbines present and visible in the Vermont landscape; 4) the tradition of the working landscape; and, 5) the efforts of wind energy developers to better inform and involve the public in the Project as it is being developed. Additionally, and most importantly, given that seventy-five percent (342-114) of the residents of Lowell cast their votes in support of the Project at the March 2, 2010 Town Meeting, this factor alone should dispel the notion that the Project, if constructed will be shocking or offensive.

Public opinion enters into this discussion because it provides a perspective as to how the average person views wind energy at the grid scale. A series of studies and reports have been cited as demonstrating the growing public understanding and acceptance of wind as a viable source of power and with it the presence of turbines on the landscape and along ridgelines. These surveys and studies include:

- March 2004 ORC Macro Survey¹⁴
- Senator William Doyle’s 2006 Town Meeting Day Survey¹⁵
- December 1997 Searsburg Public Acceptance Study: One Year Post Construction¹⁶

¹⁴ http://www.revermont.org/article/Macro_poll.pdf

¹⁵ www.timesargus.com/apps/pbcs.dll/article?AID=/20060321/NEWS/603210328/0/NEWS01

¹⁶ http://publicservice.vermont.gov/energy-efficiency/ee_files/wind/PUBLICACCEPTANCESUMMARY.pdf

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- 2003 Visual Analysis Survey: The Mount Redington Wind Farm Visual Analysis Survey¹⁷

The results of the recent statewide Deliberative Poll on “Vermont’s Energy Future” indicate strong support for the installation of wind towers¹⁸. Participants strongly favored energy obtained from renewable sources to meet Vermont’s future electricity needs. They wanted to see almost a quarter of the state’s electricity come from hydro, about 18% come from wind, and a bit under 15% come from solar, wood, and nuclear, in that order. They wanted almost none of it to come from oil or, especially, coal. Likewise, participants saw a major threat to Vermont’s scenic beauty in a coal-fired power plant, some considerable threat in a natural gas power plant, some moderate threat in transmission lines, and not much threat in a utility scale wind farm. In fact, only about 10% were extremely concerned about the visual impact of wind farms on Vermont’s scenery and 90% supported (74% strongly) a wind farm’s being built if it were visible from where they live. Thus, the public, and the average person of that public, is not likely to find this Project offensive to their sensibilities, and in fact, will most likely conclude that this Project is a desirable option for generating lower cost local energy that will contribute to a more sustainable future for this region and Vermont as a whole.

Most recently, a new poll and study on property values, released December 7, 2009 by the U.S. Department of Energy’s (DOE) Lawrence Berkeley National Laboratory (LBNL), is worth citing¹⁹. The report found that proximity to wind energy facilities “does not have a pervasive or widespread adverse effect on the property values of nearby homes.” Site visits, data collection and analysis of almost 7,500 single-family home sales in areas situated within 10 miles of 24 existing wind facilities in nine different U.S. states indicates that “neither the view of wind energy facilities nor the distance of the home to those facilities was found to have any consistent, measurable, and significant effect on the selling prices of nearby homes.” Even homes located within a one-mile distance of a wind project were found to have no persuasive evidence of a property value impact.

¹⁷ www.sheffieldwind.com/UserFiles/File/regulatory_sheffield/Attach%203%20-%20Redington.pdf

¹⁸ The Deliberative Poll, held in Burlington on November 3-4, 2007, was conducted for the Vermont Department of Public Service by the Center for Deliberative Opinion Research (CDOR) at the University of Texas at Austin, in collaboration with personnel from Public Decision Partnership (PDP) in Austin and the Center for Deliberative Democracy (CDD) at Stanford University.

¹⁹ <http://eetd.lbl.gov/ea/EMS/reports/lbnl-2829e.pdf>

GMP, VEC engage Lowell on wind project

I want to give kudos to Green Mountain Power and VEC for the work on the Kingdom Community Wind Project.

When I first heard about the project, I had a lot of questions and concerns. I imagined the worst based on my own fears and what I was hearing from others. But I kept an open mind, although I was guarded.

What impressed me about GMP and VEC is the effort they made to talk with people from Lowell and surrounding towns. I was impressed that they organized the large community forum — especially knowing that a lot of folks who don’t support wind would be there. They seem truly interested in having conversations and being honest about the good and bad about a wind farm. I find their openness refreshing and I want to thank them for keeping us in the loop as they’ve explored whether they want to build the project.

Now that I know more about it, I feel that there are many benefits for all VEC customers in the Kingdom. I am glad that GMP wants to move forward with it. Now it’s up to Lowell to vote to support the project and the surrounding towns to speak up in favor of it.

We have an opportunity to welcome renewable energy in our backyard. I hope we all find a way to do that. This letter is my attempt.

MADELEINE GREENWAY
Lowell

Letter to the Editor, 1/13/10
issue of the Burlington Free
Press in support of Kingdom
Community Wind

2. The Quechee Analysis

Also of relevance to this Project is the study done for the Redington Wind Project in Maine and the Green Mountain Club's (GMC) policy on wind energy projects. The Redington study²⁰, which targeted scenic values and the impressions of backcountry recreational enthusiasts, is of particular value in understanding the acceptability of wind farms in this area, and speaks to the notion of what is offensive or shocking. The survey group consisted of people hiking trails in the area of the proposed wind farm, a region that includes a number of Maine's highest peaks, including Sugarloaf, Saddleback, Mt. Abraham, the Appalachian Trail, Flagstaff and Rangely Lakes, and is arguably one of Maine's most scenic areas and recreational destinations. Participants were shown pictures of mountaintop views with and without the wind farm in the distance and were asked to rate each view. The overall conclusion was that the addition of the wind farm would have neither a negative nor positive impact on hikers' views from area mountaintops, with the average person still placing a positive scenic value on the view. In fact, the view of the proposed wind farm had a less negative effect on the hiking experience than views of other forms of human activity, like ski trails and facilities, roads, power lines, developed areas, clear cuts, and other industrial facilities.

The results of the Redington survey correspond with GMC's policy, which helps guide the Club in responding to wind power development proposals that may affect the Long Trail System and GMC's conserved lands. The Green Mountain Club "supports the need for increased renewable energy generation, energy conservation, and end-user efficiencies...and recognizes that generating electricity from wind holds promise to mitigate or slow the negative impacts of air pollution and climate change on the Long Trail environment and hiker health." However, GMC also believes careful siting of wind-energy developments is crucial in the protection of the Long Trail hiking experience. Therefore, GMC is opposed to windpower projects located within the 1000-foot wide Long Trail System Corridor in order to protect the outstanding recreational and natural resource values of the Long Trail System. The Lowell Mountain Project falls well outside of this corridor, at 6 miles away and farther. The policy identifies this area as the "background zone" and GMC's position concerning proposed windpower projects located here will depend on a number of factors such as location, scale, hiker safety, and visual impact as determined by impact studies and other objective methods.

Thus, the historic precedence for wind development, and the public acceptance of wind, in the Northeast and in Vermont is clearly established, beginning with the

²⁰ 2003 Visual Analysis Survey: The Mount Redington Wind Farm Visual Analysis Survey, prepared by Market Decisions, Portland, Maine, September 2004, for the Maine Mountain Power Redington Wind Farm Application for Development, Section 6 Visual and Scenic Report

2. The Quechee Analysis

windmills constructed on Manhattan Island in the early 1600s, to the windmill powered port of Nantucket in the early 1800s, to the water pumping windmills of historic farmsteads, still visible throughout this state. Modern day wind in Vermont traces its origins to the early installations on Grandpa’s Knob (1941) and Little Equinox in 1981, and continued with the first commercial wind farm established in New England at Searsburg in the early 1990s. Windpower and wind machines as a means of generating electricity have been part of the working, productive landscape in Vermont for over a half of century. Public opinion on the use of wind power and other forms of renewable energy have moved to the forefront of discussions on how to meet the energy needs of our society in a sustainable manner. As interest in wind power as an alternative energy source continues to increase, access to studies yielding empirical data becomes more available. Recent studies have shown that there is general public acceptance of wind power development, thus providing credence to the ideas and thoughts of the “average person.”

Efforts made by GMP/VEC to reach out to the public have also provided necessary information to local residents and helped them to better understand the nature of the Project, its potential impacts and its potential benefits. A number of public meetings have been held as part of the Project development process, and residents have been encouraged to speak their piece and address questions to the companies and their consultants. Please refer to the testimony of Robert Dostis in this Docket for more information on the community outreach process.

The Long Trail is arguably the most significant recreational asset in the viewshed of the Kingdom Community Wind Project and those individuals who view the Project from here will not find the Project shocking or offensive due to distance and focal points other than the Project (such as the White Mountains beyond, or with a focus on the Green Mountain spine north to Jay or south to Mt. Mansfield). That is not to say that seeing the Kingdom Community Wind Project from the summit of Belvidere Mountain will not dismay some hikers (It should also be noted that some hikers are dismayed currently when the artificial shape of the tram terminal imposed on the summit of Jay Peak is viewed from this same summit.) However, it has been shown that as visitors and residents become more aware of wind energy projects, and they begin to appear on the landscape, the acceptance of such projects increases. It is not outside of viewer expectation on a summit such as Belvidere to see many aspects of human landscape alteration, development and land use within the viewshed of a higher elevation perspective. Indeed, the Redington Wind Farm Visual Analysis Survey previously

Question card sent out to residents from Kingdom Community Wind to help inform and educate the public about the project

2. The Quechee Analysis

cited provides insight into hiker attitudes, yielding a conclusion that hikers are neutral overall with regard to seeing wind energy projects from ridgeline hiking trails, and that the average hiker still experiences positive scenic values with wind energy projects in view. In fact, hikers, as outdoors people oriented to the environment, may be more likely to accept wind energy developments as they understand the role such projects play in reversing global warming, contributing to a more sustainable future and a more healthy environment. In this regard it is important to acknowledge that a broader perspective and understanding of wind energy, local power generation, and even the form and shape of the turbines and rotors themselves, which directly reflect their function, all inform how a viewer reacts to seeing wind energy projects.

Pristine

(1) Remaining in a pure state; uncorrupted or untouched by civilization. (2) Of, relating to, or typical of the earliest time or condition; primitive or original.

To summarize and reiterate the key conclusions from the analysis in Step 1 of the Quechee Analysis contained in this report, with regard to impacts overall to the Long Trail, it can be concluded that this Project will not have an undue adverse impact on the aesthetics or the experience of the Long Trail. This conclusion is based on: 1) the limited exposure hikers will have to the Project over the length of the Long Trail that is located within the portion of the 10 mile viewshed, consisting of primarily the view from Belvidere and secondarily with the limited and partial view from Tillotson Camp; 2) the expansive nature of the view from Belvidere, de-emphasizing the prominence of the array on Lowell Mountain, within that overall view; 3) the distance of the Project from the viewer on the Long Trail - at its closest point 6 miles from the Project (diminishing its apparent scale and consequent visual impact); 4) the fact that this area and the view is not pristine (i.e. due to the Lowell asbestos mine right below the summit and the fire tower itself situated on the summit); 5) the fact that users of the Long Trail tend to be more environmentally aware and therefore better understand the nature, purpose and need for renewable energy projects of this type; and, 6) the Project context includes, in this region, a long tradition of a landscape that has been used for resource extraction and management - such as mining, gravel extraction, timber, and hydropower development. These are all factors that lead to the conclusion that the average hiker along the trail will not be shocked or offended by the Project, if constructed. When these considerations are coupled with the other 2 prongs of the second step of the Quechee Analysis - (1) that the Project is not in violation of a community standard and that there is substantial community support for the Project, and (2) that the developer has employed generally available mitigation measures that a reasonable person would consider - all combine to keep this Project below the threshold of an undue adverse impact - and therefore permissible under the aesthetics criterion.

2. The Quechee Analysis

The very nature of the region's working landscape also reinforces the sense that local residents will understand and recognize that a project of this type, which taps into a local natural resource, is consistent with the heritage of this working landscape. The area has extensive evidence of use of the landscape resource as part of its commerce and culture, and one needs to look no farther in town than to the remnants of the Lowell Asbestos Mine, which was once the primary economic force in the town, if not the region. It has a prominent presence in the landscape, readily visible from many vantage points in the region, including the Long Trail. The aerial photo of the Project site and vicinity (see Figure 2 on page 12) provides insight into some of the aspects of this working landscape by showing the agricultural and silvicultural activities on the land as a result of farming, logging and clearing. The photographs of landscape and land use conditions in the Project environs (as presented in Section 2.1.A) reinforce this. Wind power represents the 21st century evolution of the landscape and the potential energy and resource benefits it provides. In fact, the Lowell Zoning Bylaw acknowledges this tradition by permitting "windmills" as a conditional use in the Conservation-Mountain district, where the Project is proposed to be located (pg. 5). Developing fuel and/or power from this resource is integral to the region's economy and way of life, whether it is cordwood, hydropower or now wind power.

With respect to the nearby residences, it is also important to note that those residents with homes in wooded locations near to the Project will have limited Project visibility (or visual impact). Although the Nelson Farm may have an adverse impact, it will not rise to the level of being undue. The average person will not be shocked or offended by this view because: 1) the public does not have unlimited access to the farm and property, except for public travel along the Bayley Hazen Road; 2) those who do reach this point or area along the road will have become accustomed to seeing the Project from afar as they approached the area, and therefore will not be surprised to see the Project in a closer view; and 3) the public awareness, understanding of and support for the Project, and wind energy in general, reduces the potential for any viewer to be shocked when the Project is viewed. It should also be emphasized that this area represents only a miniscule amount of the Project viewshed and therefore does not have extensive exposure overall to the public;

The Bayley Hazen Road is addressed elsewhere in this report but it is important to restate the factors that relate to visual impacts to the road



Views of turbines are now becoming commonplace throughout Vermont, as seen by this turbine located in Albany



Piles from the asbestos mine in Lowell



Logging activities are regularly seen in this area

2. The Quechee Analysis

and its users in this particular location. The one mile end section of the public road that is in the open does not appear to be well traveled, particularly as it becomes a dirt trail past the Nelson Farm, and at this point it is not suitable for 2 wheel drive vehicles. It should be noted that the website for the Bayley Hazen Road has travelers avoid this section by directing them to follow Route 58. The road is used in winter by snowmobilers and cross-country skiers who are following the Catamount Trail. Based on 2 winter site visits the trail did not appear to be extensively used by snowshoers or cross-country skiers; there did appear to be extensive snow machine activity. A Catamount Trail Association representative confirmed that this is not one of the highest use portions of the trail²¹. Given the data which indicates that hikers (and therefore, by association, winter hikers on ski or snowshoe) do not have negative reactions when viewing wind energy projects from hiking trails (see Section 2.2.B of this report, beginning on page 52), it can be concluded that short duration views of the Project – over a distance of less than a mile (and with more compelling views to the east) – will not offend these trail users. Nor will enthusiasts of snowmobiling be offended, as their activity creates distinct aesthetic impacts that will not necessarily be compounded by views of the Project. It is also important to note that those participating in these activities in this location will have selected longer distance views of the Project as they approach the area, and they will thus become accustomed to seeing the Project, and will not be offended by this closer view.

The appearance and visibility of the other Project elements, including the transmission line upgrade and the collector lines and Project access roads, will not shock or offend the average person. Transmission lines and corridors are present throughout the state, either as separate elements in the landscape or as corridors along developed areas such as major state highways. The proposed transmission line upgrade (and its associated elements) is consistent with what people already see and experience along sections of Route 100 within the Project's 10 mile radius, and thus will not be shocking or offensive. The changes being proposed for the existing substations are not so extensive that they will result in any additional aesthetic impacts that could be considered undue.

The access road and collector line elements (road, structures, related clearing) will not appear to be so dramatic a change or visual impact to shock any viewers; in fact the clearing and construction necessary will be similar to the clearing and construction activity associated with transmission line upgrades, new logging roads, and even the clearing on mountainsides associated with ski trails.

Finally, given the Project's overall limited visibility, that the Lowell Mountains have not been identified for their scenic quality and that the Project will not substantially diminish the scenic and aesthetic qualities of the region, and the fact that these scenic

²¹ LandWorks (2nd) phone conversation with Catamount Trail representative, 5-3-10

2. The Quechee Analysis

qualities have not been directly impacted or altered, one cannot conclude that the average person, who has no direct interest in the Project, and is not directly impacted by the Project, will be offended or shocked by its presence in the landscape. This landscape is not pristine – rather, it is a landscape with a long tradition of resource use and development - and therefore can accommodate this Project, which has been proposed for a suitable, accessible and logical location.

2.2.C Has the applicant taken generally available mitigating steps which a reasonable person would take to improve the harmony of the proposed Project with its surrounding?

The Project developers have taken a number of generally available steps that a reasonable person would take and constitute effective mitigation for this Project. The mitigation measures begin with the site selection itself and range through the design of the Project as well as measures the applicant has taken to work with the residents of Lowell and the region to explain the Project and to address questions and concerns the public may have.

1) *Project siting.* The Project has been selected for a site that is readily available and suitable for this type of development. The Project is compatible with the ongoing management and use of the mountainside for forest resources, and indeed the tradition of resource use in the immediate region, which includes mining, forestry and agriculture (see Figure 6).

2. The Quechee Analysis

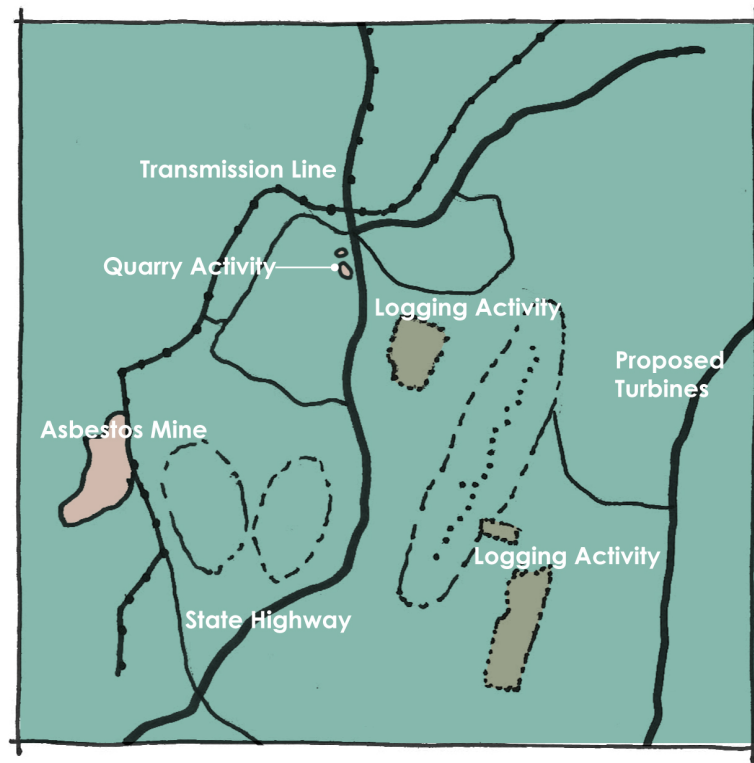


Figure 6. This diagram presents a shorthand view of the utilitarian aspects of the landscape surrounding the Kingdom Community Wind Project. It is a working landscape with elements that reflect the long tradition of resource use and management and the presence of infrastructure such as transmission corridors and state highways. The wind energy project represents a natural transition and evolution of this working landscape to a new era.

The mountain's contours and forest cover will also allow the access road and collector lines to be located in a manner that will minimize visual and environmental impacts, and LandWorks has been and will be directly involved in the siting and detailed design of these Project elements to mitigate impacts wherever possible. The applicant has refined and reduced collector line and access road distance, as well as corresponding clearing and cut and fill requirements based on LandWorks recommendations - and this process constitutes an important mitigation measure. When feasible, the collector line and access road will be collocated within the same cleared corridor. "Feathering" of vegetation at the edges of the clearing will be employed to avoid straight lines of clearing and provide a more natural appearance. In addition, the access road (portions of which are anticipated to be built over the existing forestry roads) and crane path will be allowed to revegetate naturally.

2. The Quechee Analysis

The Project also is located adjacent to an existing transmission line, which will be upgraded to accommodate the Project. No new corridors will need to be developed for the electrical transmission, and the Project will include collocation on the line of both local distribution and phone service lines, another key mitigation factor.

After reviewing the preliminary transmission line layout, LandWorks worked with the Project developer to refine its alignment in some locations to minimize aesthetic impacts. By bringing transmission lines roadside and abandoning existing distribution lines that pass through private property, as is proposed for the majority of the transmission line corridor, views of the adjacent landscape are improved. The removal of existing lines from aesthetically valuable landscapes, which in many cases include farm fields, barns, ponds, and woodland edges, will thus result in an improvement in visual quality for these landscapes. In some instances, such as in the village of Westfield, the transmission line is instead proposed to run through the existing easement away from the road in order to preserve valuable mature trees that line the road. Although this may represent a compromise in terms of access and maintenance for the utility company, the aesthetic value of maintaining the trees has been deemed more important.

The proposed KCW step-up substation and maintenance building is located approximately 1.4 miles along the access road away from Route 100. Due to its distance away from public vantage points and the screening effect of surrounding vegetation, no additional mitigation steps appear necessary.

The proposed VEC Lowell #5 Substation will consolidate and replace the two existing VEC substations in Lowell, and the new substation will be located within the existing Irasburg #21 substation fence. Although it will have components taller than the previous substation (36 feet vs. 24 feet), the removal of the existing Lowell #5 Substation will result in a visual improvement for this portion of the site. Removal of some existing evergreen trees may be required to accommodate new lines entering the Project site, and an additional 5-10 evergreen trees may be required to buffer views of the new substation. A post-construction review between the utility company and involved parties will be conducted as necessary to negotiate any other reasonable mitigation steps that may be undertaken to address visual impacts.

All improvements for the proposed Jay 17 substation upgrade will be within the existing substation fence. Although it will have components taller than the previous substation (45 feet vs. 24 feet), the site has extensive tree screening around it, which limits views of the substation. This existing vegetation will be maintained as much as possible, but additional evergreen tree screening may be required. A post-construction review will take place for this site as well to ensure that all reasonable mitigation steps have been taken.

2. The Quechee Analysis

2) *Project design.* A landmark publication entitled *Wind Power In View* emphasizes the importance of employing a number of aesthetic guidelines to facilitate the effective design of grid scale wind energy projects that minimize aesthetic impacts.²² The Kingdom Community Wind Project on Lowell Mountain adheres to a number of these recommendations including:

- *Provide visual order* - this Project accomplishes this by locating the Project in a consistent fashion along the north south height of land of Lowell Mountain, following the “lay of the land.” (see Figure 7)

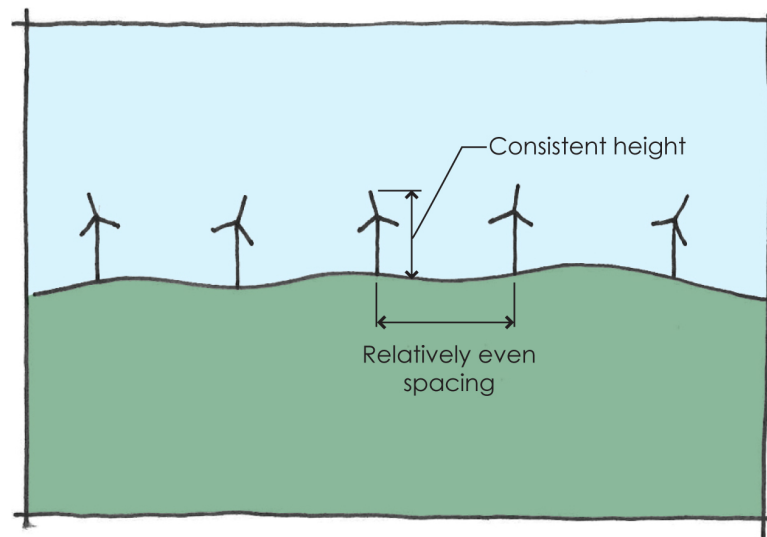


Figure 7. Consistent spacing along a linear corridor creates a sense of visual order when wind energy arrays are viewed from a distance. The view of turbines above an unbroken treeline along the ridge is preferable to irregular spacing, visible cuts and grading, and multiple array patterns.

- *Provide distinct visual units* - the Project consists of one distinct and continuous visual pattern that is pleasing to the eye due to its regularity - there are not turbines all over separate summits or ridges - this Project will constitute one distinct visual unit (see Figure 8).

²² “Design As If People Matter: Aesthetic Guidelines For A Wind Power Future”, by Paul Gipe, pp. 173-212 in *Wind Power In View* edited by Martin Pasqualetti, Paul Gipe and Robert W. Righter, Academic Press (Sustainable World Series), San Diego, California, 2002.

2. The Quechee Analysis

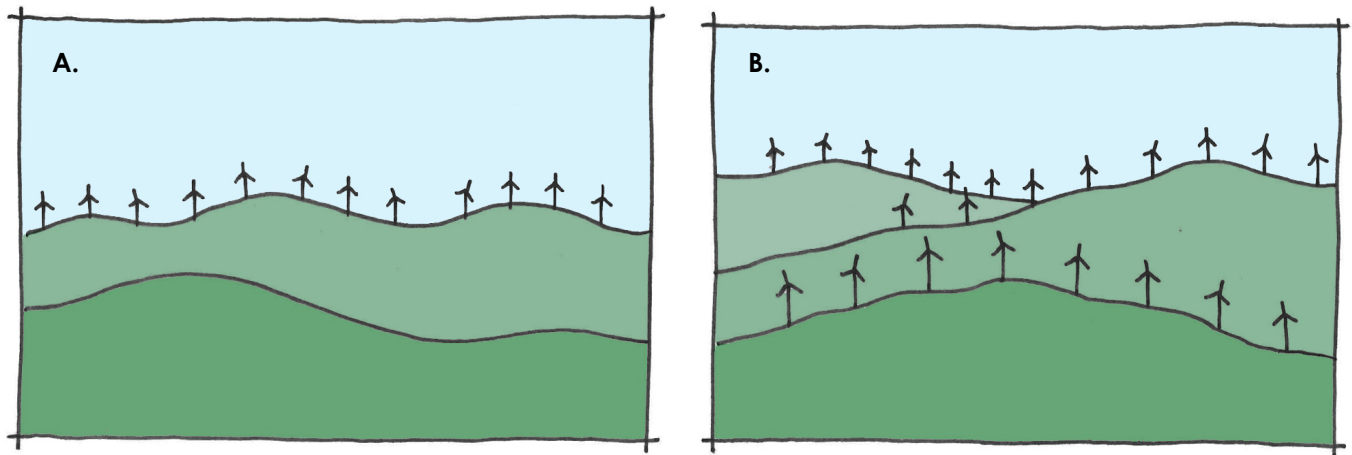


Figure 8. The Kingdom Community Wind Project is sited as one singular, linear array of turbines (A). It is not a number of different arrays scattered among ridges over a larger area (B). This factor reduces visual clutter and reflects a key aesthetic guideline set forth in *Wind Power in View*. Additionally, the burial of the collector lines along the ridge, as a mitigation measure, eliminates any visual clutter between the turbines when viewed from afar.

- *Provide visual uniformity* - the same turbines, with the same light colored towers are to be used throughout the Project, therefore creating visual uniformity.
- *Provide open spacing* - the turbines, for the most part, when seen from eastern or western vantage points in particular, have regular and sufficient open spacing between them so as not to create too much of a clustered effect or irregular pattern.
- *Minimize earth moving* - the Project design has had, as one of its key goals, the intent to minimize cut and fill slopes and consequent clearing. Where appropriate and necessary, revegetation of cleared areas created for the access road and collector lines will be supported and facilitated as part of the Project mitigation efforts.
- *Project scale* - the relative scale of the turbines themselves to the landform they are placed on underlines the conclusion that this is an appropriate site - the turbines will not overwhelm or dominate the landform of the mountain (see Figure 9).

2. The Quechee Analysis

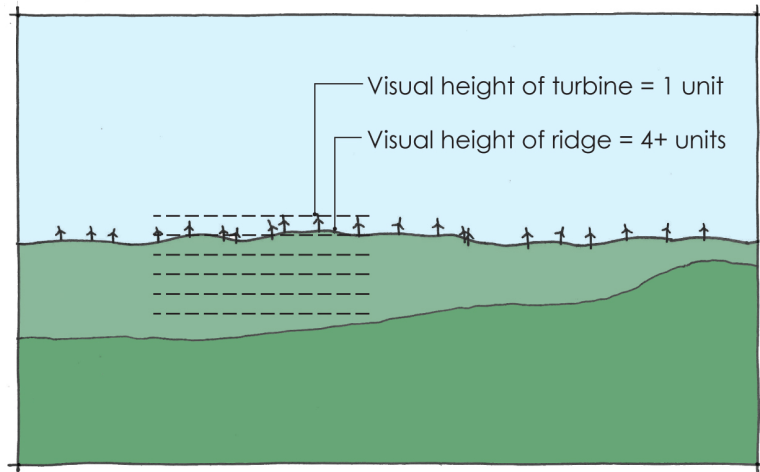


Figure 9. In a rural, less developed landscape, the relative scale of the key Project elements, the turbines themselves, can reduce the visual impact when the Project is seen from long distances. The turbine heights (towers, nacelles plus rotors) are often an issue with regard to visual impact, particularly if their scale seems large relative to the mountain mass and height. That is not the case with Kingdom Community Wind. The turbine heights, when viewed from afar, do not overwhelm the mountain landform, as the turbines represent only 1/4 of the overall apparent vertical scale of the mountainside, and therefore do not overwhelm or dominate the landform.

3) **Public outreach.** *Wind Power In View* also highlights the importance and value of public information and recommends interpretation and public education as part of any wind project development. Green Mountain Power conducted an extensive public outreach effort to inform the public as the Project's components and benefits. GMP has pledged to continue this effort through the Project's development and completion. Interpretive signs and information will be provided in an appropriate location or in several locations to introduce the public to the Project, its parameters and purpose (see Figure 10).

2. The Quechee Analysis

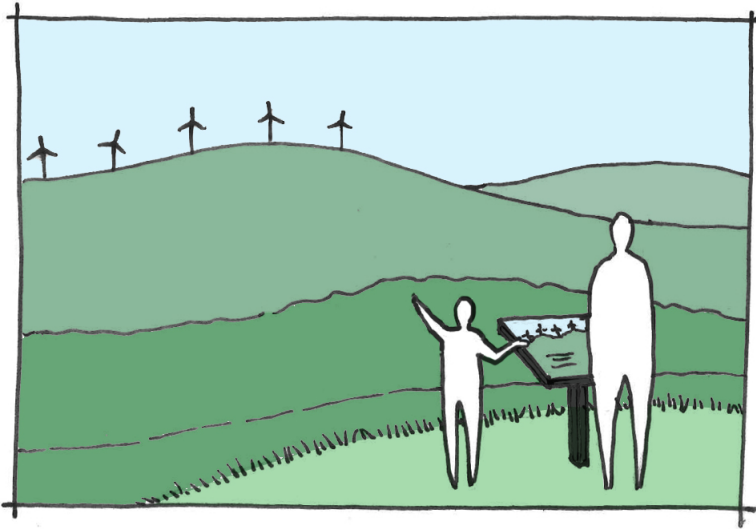


Figure 10. Interpretive opportunities provide the public with information so that they can better understand the Project and its purpose, and learn more about wind energy.

4) *Decommissioning*. Finally, at the conclusion of the Project's life, the Project will be able to be decommissioned and the Project landscape will be restored to the greatest extent possible in a fashion that will allow it to return, as is feasible, to its pre-existing state.

2.3 Overall Conclusion

Based on the foregoing analysis, this assessment concludes that **the Project will not have an undue, adverse impact** on the aesthetics or scenic beauty of the region because none of the three Quechee conditions exist: (1) the Project **does not** violate a clear, written community standard intended to preserve the aesthetics or scenic beauty of the area; (2) the Project **does not** offend the sensibilities of the average person and is not out of character with its surroundings or significantly diminishes the scenic qualities of the area; and, (3) the applicant **has taken** generally available mitigating steps which a reasonable person would take to improve the harmony of the Project with its surroundings.

3. Orderly Development and Public Investments

3.1 Orderly Development

Orderly Development is one of the Section 248 criteria that must be properly and satisfactorily addressed before a Certificate of Public Good is issued to the applicant. The analysis addresses how and if the Project, as proposed, is consistent with the town and regional plans, the recommendations of the municipal legislative bodies, and the land conservation measures contained within the plan of any affected municipality.

The Kingdom Community Wind Project is located in the Town of Lowell, which is in Orleans County in Northern Vermont. The Town is subject to the Northeastern Vermont Development Association's (NVDA) Regional Plan that went into effect on August 6, 2006.

The Town of Lowell voted at Town Meeting on March 2, 2010 by a margin of 342 to 114 to support the Kingdom Community Wind Project proposed for Lowell Mountain. GMP has also entered into an agreement with the Town of Lowell that provides financial support as well as support for town services. An extensive outreach effort conducted by local residents and GMP (addressed and described in the testimony of Mr. Robert Dostis of GMP) facilitated understanding of and support for the Project. Therefore it can be concluded that this vote represents both a directive to the legislative body and an indication that the community considers this Project to be consistent with the orderly development of the town as a whole.

The Lowell Town Plan, readopted on April 14, 2009 does not identify Lowell Mountain as a scenic area where development should be prohibited, but does recommend that "that all land above 2,000 [feet] be designated as being in [the Conservation-Mountain] district" (pg. 5) and that it "should have a very low intensity of development" (pg. 5). The Plan specifically recommends the development of renewable energy resources, which "would include the use of wood, solar, wind, and hydro energy" (pg. 31). This recommendation is reinforced in the town's Zoning Bylaw, which specifically identifies "windmills" as a conditional use in the Conservation Mountain District. The proposed development of the KCW Project is thus consistent with the Plan's recommendations for both renewable energy development and the Zoning Bylaw's provision for conditional use approval of windmills in this district.

3. Orderly Development and Public Investments

The NVDA Regional Plan provides guidelines for wind energy development (see Appendix 11) but also defers to the local communities as to their decision-making prerogatives for developing renewable energy facilities. The Plan states that towns may take different positions on wind power and that each town *consider* wind energy. Thus, the Project is consistent with the Regional Plan.

Additionally, there are no specific land use provisions or restrictions within the Town or Regional Plan specifically applied to this area of Lowell that would preclude the development of the Project. This Project is located in what would be considered a Rural Area and the NVDA Regional Plan states that Rural Areas should “receive very little commercial or industrial development unless it occurs in an industrial park, in an area specifically designated in the local bylaw, or occurs in an appropriate scale for its rural surroundings.” The Project is located in a zoning district in which wind is permitted as a conditional use. Grid scale wind turbines and projects are, by their very nature, developments that must be above the treeline and of a certain height and located along ridgelines, which are often in rural areas. They cannot therefore readily conform to the criteria set forth in the NVDA Regional Plan with regard to commercial or industrial development in rural areas. Nonetheless, the actual development footprint of this Project will be relatively small given that only access roads coupled with collector lines and areas for the turbines will be cleared for the Project. Thus when considered within the context of the extensive amount of rural area in this region, the Project takes up a very small amount of this area and will have little, if any impact on the overall orderly development of the region. In fact, the Project will be connected to an existing transmission corridor at the base of the Project site, and this Project will upgrade that corridor, sustaining and enhancing orderly development.

The Project is also consistent with the current use and development of the property as a managed forest for timber harvesting - it is currently resource land that provides wood products to the local economy and region and therefore is consistent with historic land use, land management and resource development practice within that region. The development of a local source of renewable energy, which will flow directly into the regional power grid will support the orderly development of the region.

Similarly, the Project does not have an undue adverse impact on the orderly development of other towns within the ten-mile radius. There are no undue adverse aesthetic impacts and, as Mr. Pughe and Mr. Kavet indicate, there are no adverse impacts on traffic or on the local economy that would be unfavorable to the development of the region. Moreover, most towns support the development of locally generated alternative energy resources that promote and increase energy independence and reliability.

3. Orderly Development and Public Investments

Thus, in conclusion, this Project will not interfere with the Orderly Development of the Region, is supported by the Town of Lowell voters, is consistent with its Town Plan and Zoning Ordinance and does not conflict with the overall intent and purpose of the NVDA Regional Plan and in particular the plans' advocacy for the development of renewable energy resources and generating facilities within the region.

3.2 Public Investments

Section 248 also references and incorporates 10 V.S.A. Section 6086, which includes Criterion 9(K) Development affecting public investments. This criterion addresses whether or not a project will unnecessarily or unreasonably endanger the public or quasi public investment in public facilities, services or lands or materially jeopardize or interfere with the function, efficiency, or safety of, or the public's use or enjoyment of or access to the public facility, service or lands.

The Kingdom Community Wind Project will not unnecessarily or unreasonably endanger the public or the quasi-public investments in the Projects' vicinity, nor will it interfere with the function or enjoyment of these investments. The Kingdom Community Wind Project does not directly abut any public investments, other than Route 100, which lies at the base of the Project site. The Project access road begins at Route 100, and an existing transmission line along Route 100 will need to be upgraded. The Project's access and necessary transmission line upgrade will not materially affect the use, safety or overall function of this public investment. In fact, the highway is intended to serve development along it and has had the transmission line corridor collocated along the highway Right of Way for many years. Highway rights of way in Vermont also serve as utility corridors in this use will be consistent with that practice.

The nature and scale of wind energy projects dictates that potential impacts to the enjoyment of public investments also be considered for those public resources or investments which may be within the viewshed of such projects.²³ There are a number of public investments within this viewshed, including public properties, schools, historic and recreational resources. The Aesthetic Assessment prepared by LandWorks and the Historic Sites and Structures Review prepared by Liz Pritchett as part of this Petition assess the potential impact to these investments in detail, and found that the Project will not result in an undue adverse impact to these

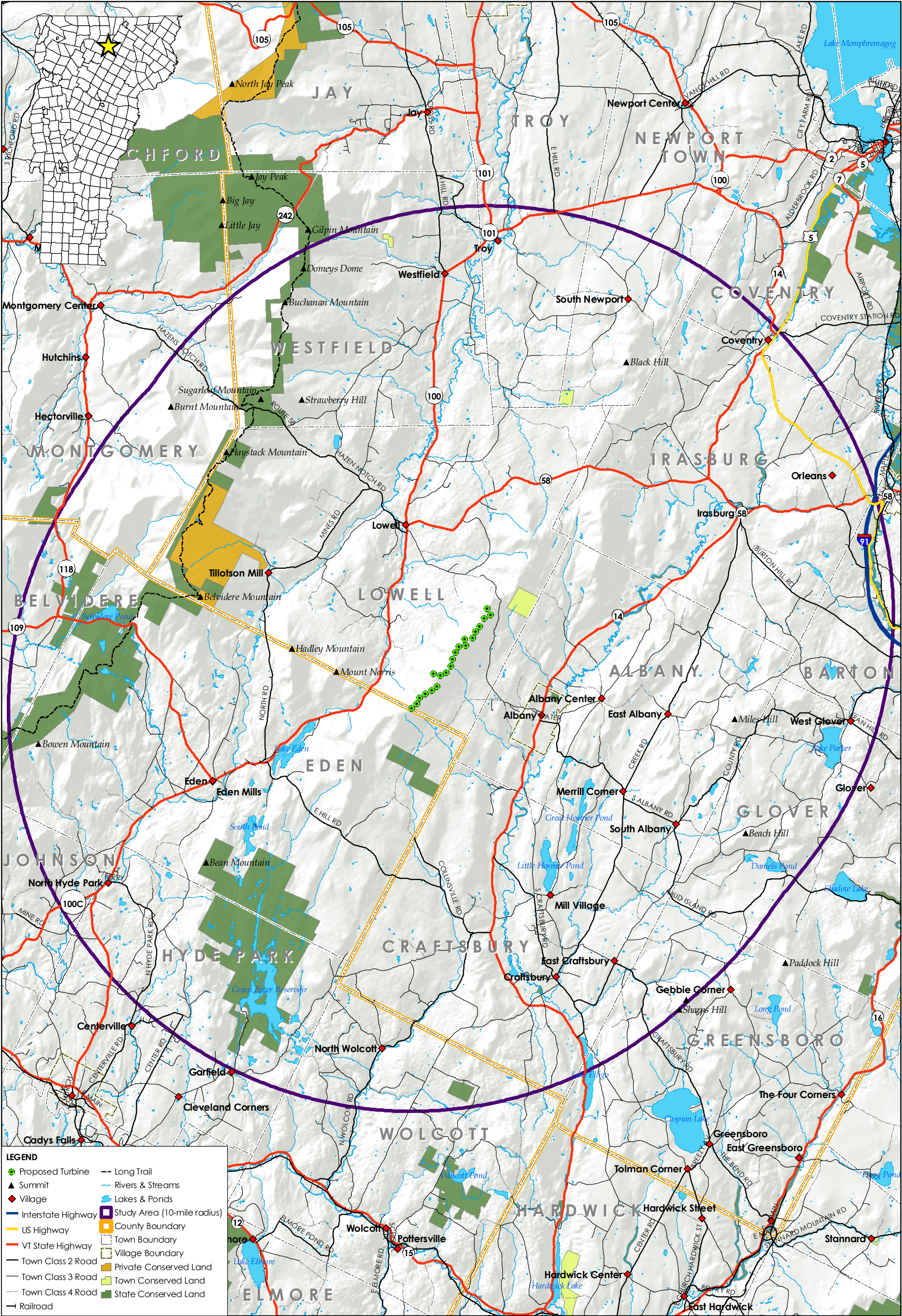
²³ Docket 7176, order of 8/8/2007 at page 105

3. Orderly Development and Public Investments

investments. Thus, it can be concluded that the Project will not directly affect the use or enjoyment of these properties and resources.

Two recreational resources in particular are worth identifying - the Long Trail and the Catamount Trail - even though they are partially funded and managed by independent organizations (The Green Mountain Club and The Catamount Trail Association). The Aesthetic Assessment prepared by LandWorks analyzes the potential impacts to the Long Trail and concludes that while there will be an adverse impact to a few locations within the 10 mile viewshed radius, those impacts will not: 1) endanger the public in any fashion, 2) rise to the level of undue, adverse impact, and 3) unduly interfere with the public use and enjoyment of the trail. The basis for this conclusion, is in part, due to: 1) the limited exposure of the Project to hikers using the Long Trail; 2) the distance of the Project from the Long Trail; and 3) an evaluation which concludes that a large portion of the users of this resource will find the limited visibility of the Project acceptable and understand its need and purpose within the larger context of environmental concerns.

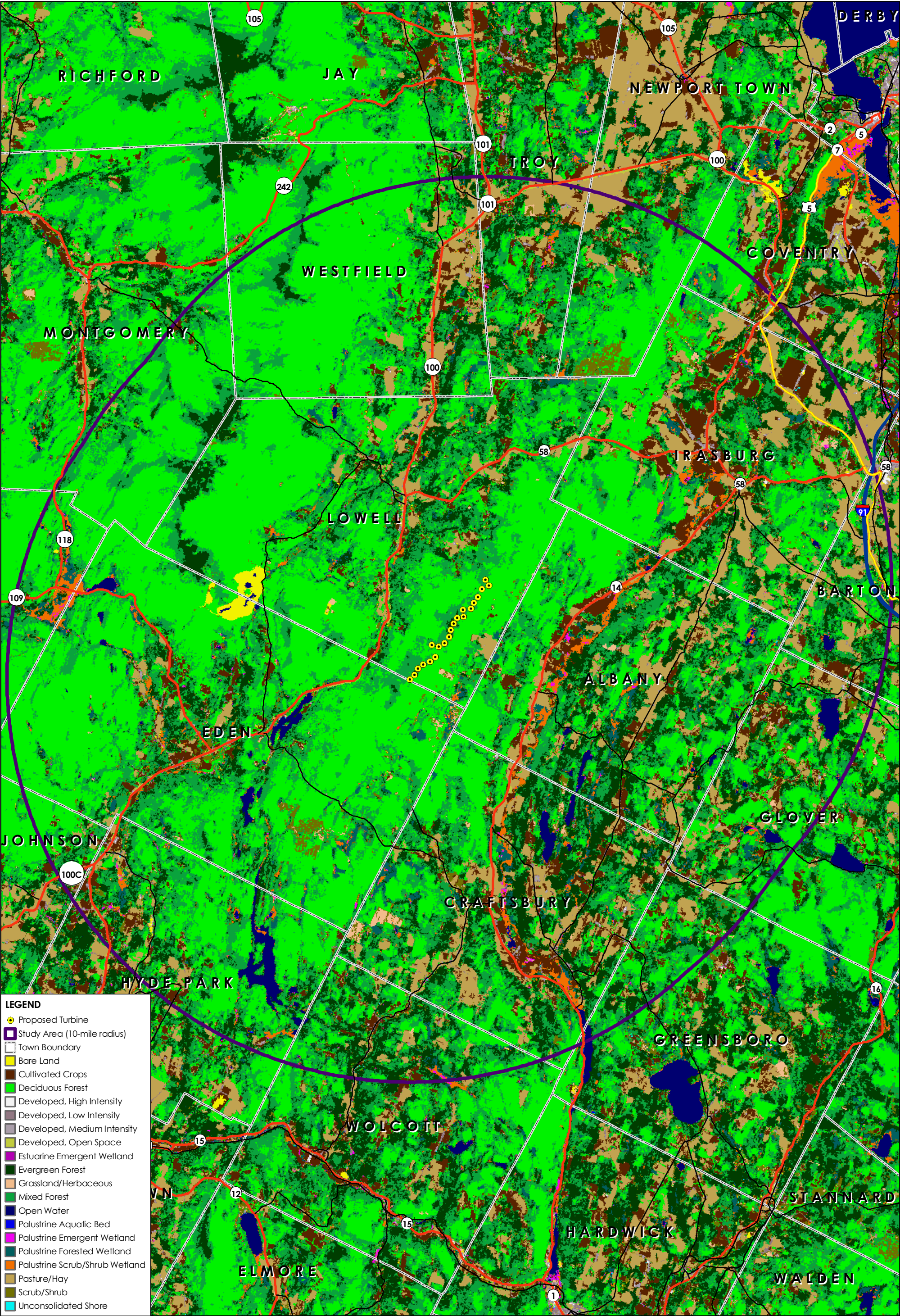
The Catamount Trail, which is located along the eastern base of Lowell Mountain and then climbs over the ridge at a location north of the Project, will be within view of the Project for a distance of approximately 0.7 of a mile. The orientation of the view along this stretch is to the east, away from the Project. Catamount Trail users are primarily cross country skiers and snowshoers and are oriented toward the trail experience itself and the recreational values it provides. The trail does include backcountry environments, as well as villages, logging roads, more developed landscapes and snowmobile trails. In this stretch of the trail it is collocated with a snowmobile route, and travels through an active snowmobiling area. Given that the area is well used by motorized recreational machines, with their associated noise and smell, lowers the expectations and alters the experience of the user in this area. Therefore it cannot be concluded that the short distance within which one will have a view of the Project, although in relatively close proximity, will have an unduly adverse impact on the user's enjoyment or unduly interfere with their use of the resource.



NOTE: Map based on GIS data available at the time from VCGI & GMP. Data is only as accurate as the original source and is not guaranteed by LandWorks. For planning purposes only. Date: 4.12.2010 Prepared by: NS

Appendix 1. Overview Map

Kingdom Community Wind



NOTE: Map based on GIS data available at the time from VCGI & GMP. Data is only as accurate as the original source and is not guaranteed by LandWorks. For planning purposes only.

Appendix 2. Land Cover

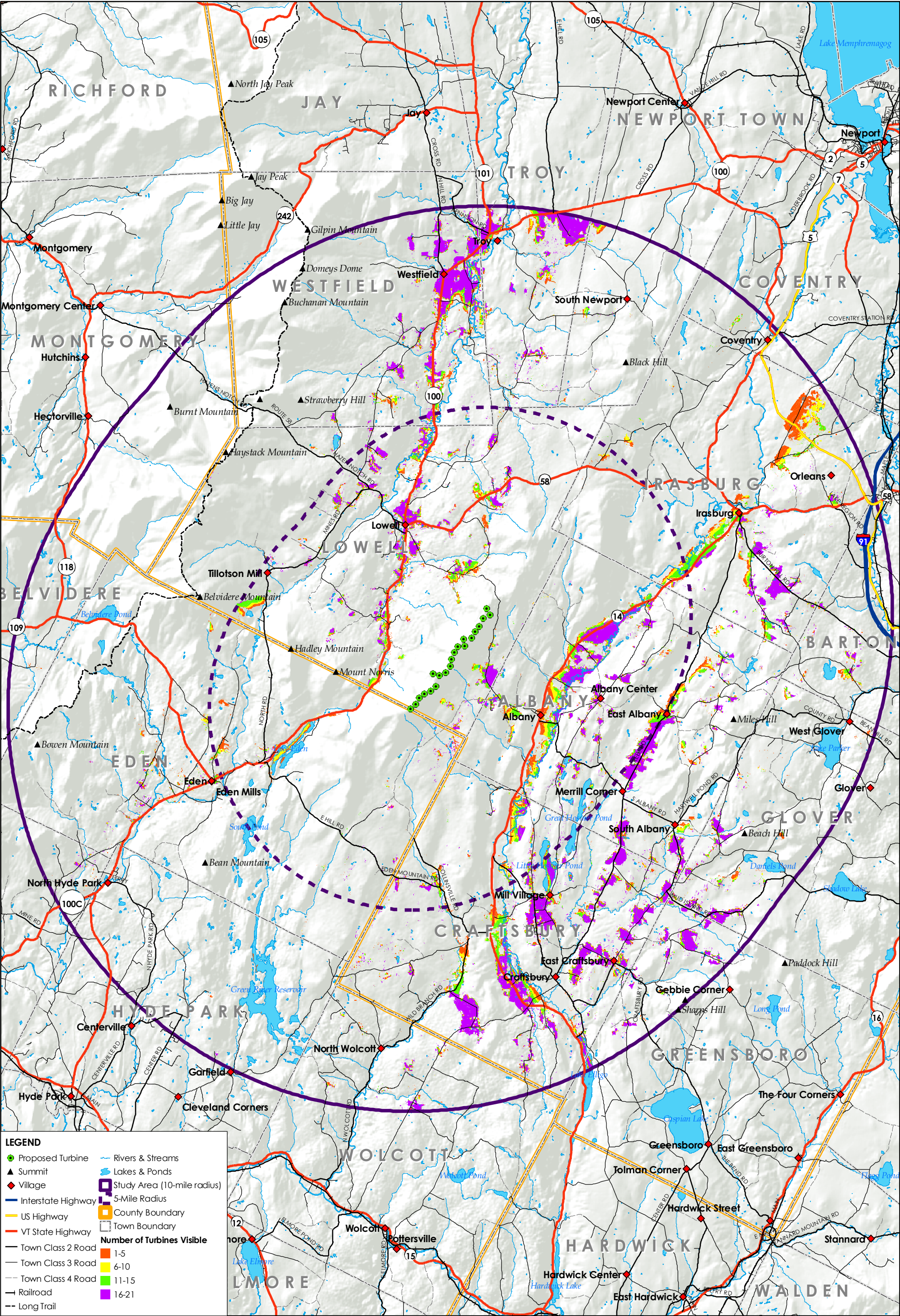
Kingdom Community Wind

Date: 4.12.10



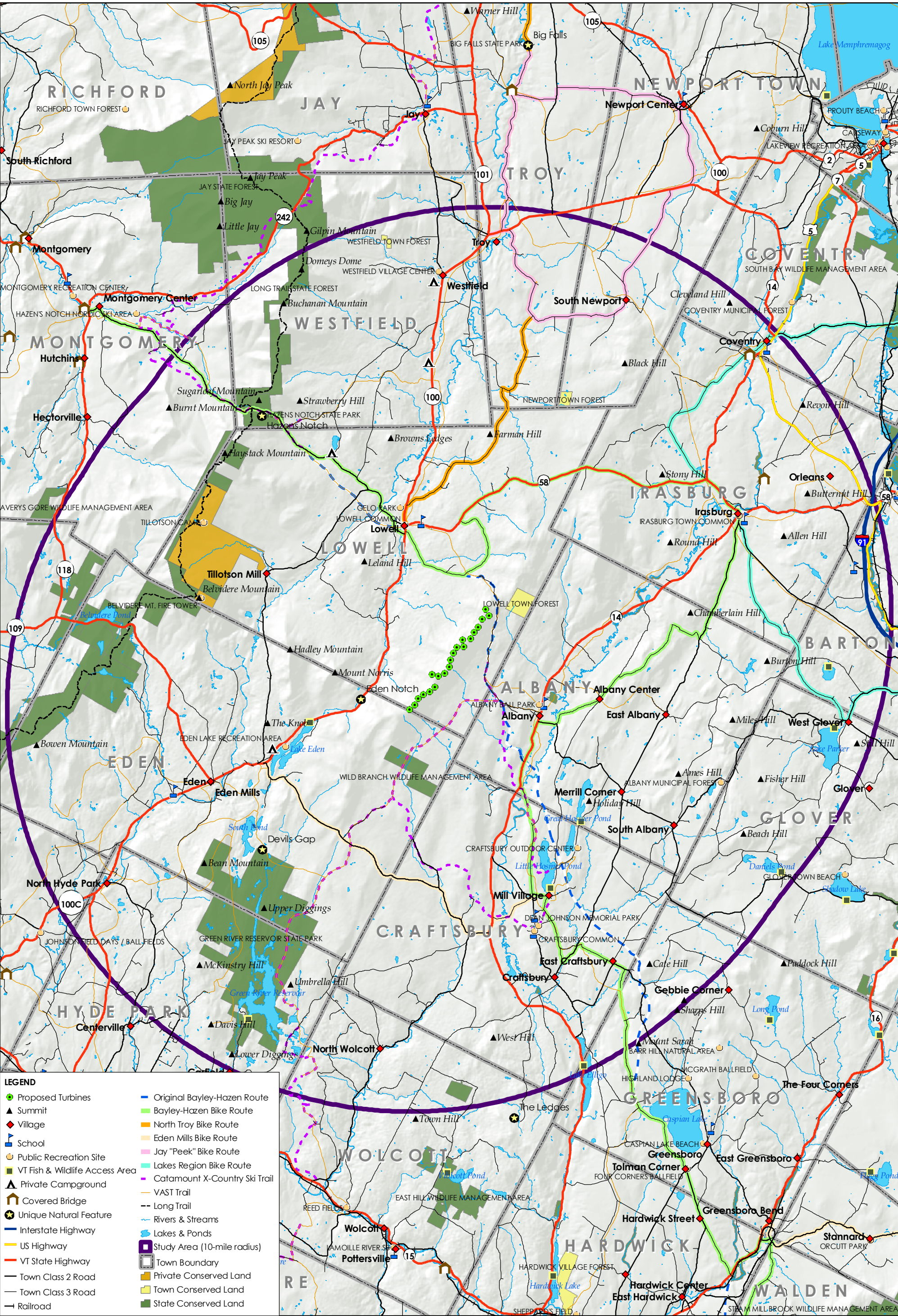
Prepared for Green Mountain Power
Prepared by LandWorks, Middlebury, VT





NOTE: This map depicts areas of POTENTIAL visibility of open areas from the turbine hub (85m). Forested areas are assumed to have no visibility due to intervening vegetative cover. Not all turbines (or all parts of turbines) will be seen from each location. The map only accounts for topography and deciduous, coniferous, and mixed forest cover at an assumed height of 40 feet. The map does not account for other factors such as buildings and structures, actual tree height and density, site specific vegetation and/or removal, variations in eyesight, and atmospheric and weather conditions. Under certain conditions this map overstates where turbines will be seen from. Potential viewshed is based on GIS data available at the time from VCGI & VERA. Data is only as accurate as the original source and is not guaranteed by LandWorks.

Appendix 3. Potential Visibility from Open Areas



NOTE: Cultural Resource map is based on GIS data available at the time from VCGI, with the following exceptions: bike routes and covered bridges were obtained from the NVDA publication "Cycling the Kingdom's Back Roads"; proposed turbines provided by GMP; 10-mile radius generated by LandWorks. Data is only as accurate as the original source and is not guaranteed by LandWorks.

Appendix 4. Cultural Resources

Kingdom Community Wind

April 12, 2010

Prepared for Green Mountain Power
Prepared by LandWorks, Middlebury, VT



Appendix 5. Photographic Inventory

Project Vicinity



1. Northbound on Route 100, the Project Area starts to become visible to travelers in Eden near the Route 118 intersection.



2. South of the entrance to Mt. Norris Boy Scout Reservation, the Project Area will be visible to the right.



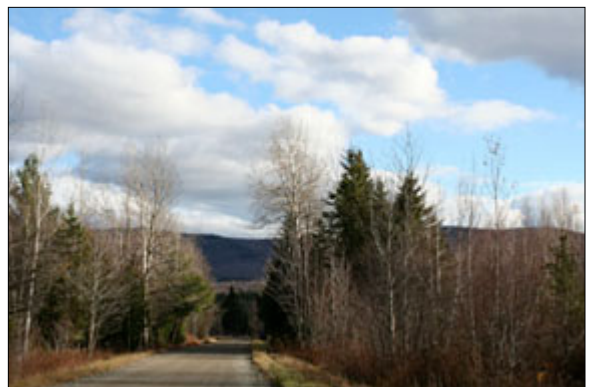
3. The Eden Campground is located near the base of the southern portion of the Lowell Mountain Range.



4. A typical view of the Lowell Mountains from Cheney Road in Lowell encompasses roadside vegetation and limited views of the Project Area.



5. The beach at the Eden Campground is oriented in a southern direction - away from the Project Site.



6. Heavily wooded areas and roadside vegetation on Cheney Road limit views of the Project Area.

Appendix 5. Photographic Inventory

Project Vicinity



7. Another photo from Cheney Road shows a view of Lowell Mountains through roadside vegetation.



8. The back side of the Lowell Elementary School (near Gelo Park) has limited views of the Project Area due to existing tree cover.



9. The intersection of Route 100 and Route 58 in Lowell allows a brief view of the Project Area.



10. Heading east on Route 58 from Lowell the northern end of the Lowell Mountains is visible around mile 3.2.



11. The view of the Project Area from the Lowell Elementary School is interrupted by evergreen trees.



12. View of northern end of Lowell Mountains from Route 58 (2.5 miles east of Route 100) with farmland in the foreground.

Appendix 5. Photographic Inventory

Project Vicinity



13. Driving east on Hazen's Notch Road in Lowell the Project Site is visible above Leland Hill intervening in the foreground.



14. Lowell Mountains are visible behind business enterprises along Route 14.



15. Existing electrical infrastructure along Route 58 near Irasburg .



16. Municipal Offices in Albany are close to the Project Area, however, views are not likely due to intervening trees and structures.



17. Logging activities in the Project Vicinity.



18a. View of Lowell Mountains from Bayley Hazen Road, Albany. The Nelson Farm is visible at the base of the mountains.

Appendix 5. Photographic Inventory

Project Vicinity



18b. Bayley Hazen Road, continued



19. Residence on Creek Road in Albany with residential-scale wind-turbine in place.



20. A view toward Lowell Mountains from Albany Center with farm building in the foreground.



21. Creek Road through Albany and Craftsbury contains many open views of the Lowell Mountain Range.



22. A residence in Albany Center with portions the Lowell Mountain Range visible beyond.

Appendix 5. Photographic Inventory

Long Distance Views to Project Area (Outside 5-Mile Radius)



23. Lowell Mountains and surrounding landscape as seen from Troy near Project 10 mile radius.



24a. Burton Hill Road in Irasburg allows open views of the mountain range. See two additional photos below:



24b. Burton Hill Road, continued



24c. Burton Hill Road, continued. The view of Lowell Mountains is to the left. Jay Peak is straight ahead in the distance.



25. Northern end of Lowell Mountain Range from Back Coventry Road.



26. Route 100 southbound from Westfield. The Lowell Mountain range is visible in the distance.

Appendix 5. Photographic Inventory

Long Distance Views to Project Area (Outside 5-Mile Radius)



27. Collinsville Road, Craftsbury has panoramic views of the Lowell Mountains to the west.

Appendix 5. Photographic Inventory

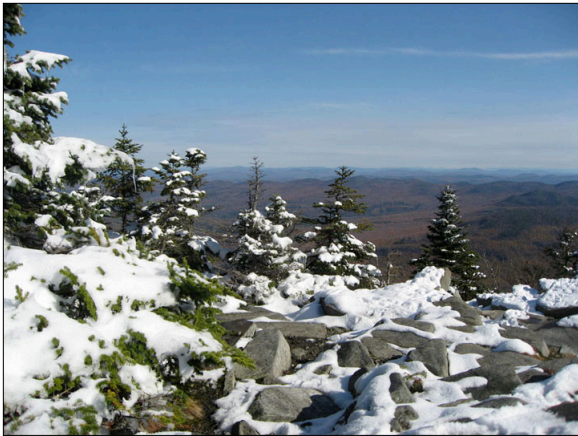
Key Viewing Locations



28. Looking west from the Irasburg Town Green, portions of the Lowell Mountain Range are visible above the intervening corridor, Route 58 and utility lines.



29. Historic structures on the eastern side of the Irasburg Town Green.



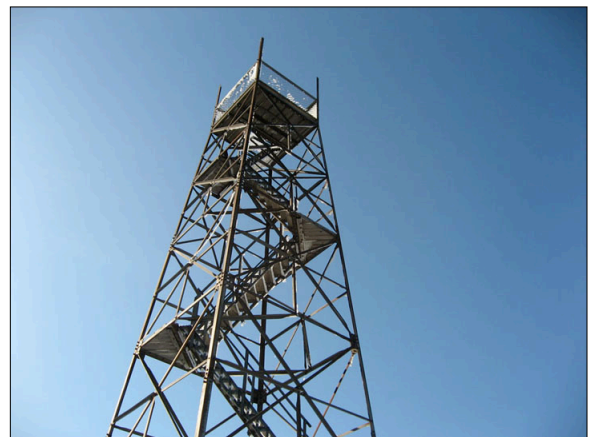
30a. Views atop Belvidere Mountain near base of fire tower.



30b. View from Belvidere Mountain, continued.



31. Another view from the Irasburg Town Green oriented southwest. Intervening structures distract the viewer from the mountains beyond.



32. The Belvidere Fire Tower as seen from below.

Appendix 5. Photographic Inventory

Landscape and Landscape Context



33. View of Jay Peak to north from Belvidere Mountain Fire Tower



34. View of mountains to the south from Belvidere Mountain Fire Tower.



35. View of Lowell Mountain Range from Belvidere Mountain Fire Tower with asbestos mine below, snow-covered Mt. Washington in the distance.

Appendix 5. Photographic Inventory

Cultural & Recreational Resources



36. Bayley Hazen Road in Albany becomes a dirt road and eventually a Class 4 Road. This photo was taken near the Catamount Cross Country Trail.



37. The southern entrance of the Wild Branch Wildlife Management Area with a section of the Lowell Mountains visible above treeline.



38. A sign marks an entrance to the Wild Branch Wildlife Management Area in Eden and Lowell.



39. The entrance of the Green River Reservoir State Park in Hyde Park.



40. A typical roadside view through the Wild Branch Wildlife Management Area allows no views of the Lowell Mountains due to heavy roadside vegetation.



41. Paddlers on the Green River Reservoir.

Appendix 5. Photographic Inventory

Cultural & Recreational Resources



42. The Coventry Covered Bridge is located just within the 10 mile radius for the Project but is not oriented in the direction of the Project.



43a. Looking west from the shoreline of Great Hosmer Pond near the Craftsbury Outdoor Center. Intervening topography and vegetation eliminate views from this vantage point.



43b. Another view toward the Lowell Mountains from the shoreline of the Great Hosmer Pond near the Craftsbury Outdoor Center. The mountain range is not visible.



43c. Higher on the trail to the shoreline, the ridgeline of the Lowell Mountains is barely visible through the trees.



44. The view from the Fish & Wildlife Access Area on the Great Hosmer Pond does not include the Lowell Mountains.



45. The approach to the Little Hosmer Dam from the road includes a window of visibility of the Project Area to the north.

Appendix 6A. Visual Simulation of Proposed Transmission Lines

Kingdom Community Wind

+/- 43’ Above Grade, Single Phase & 3-Phase Distribution

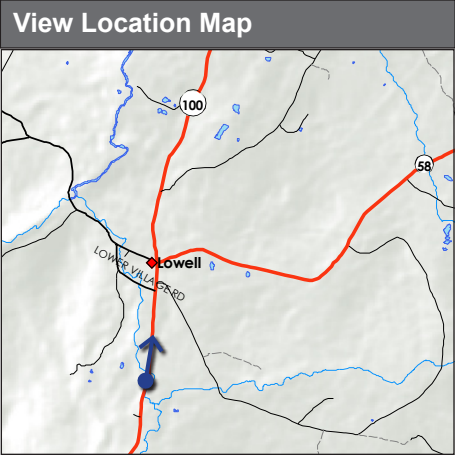


1



2

Note: These simulations are representative renderings for reference only (not specific to the locations shown) and may not depict the exact field conditions or actual construction details.



Simulation Information	
Transmission Line Information	1. Description: 46 kV transmission with 12 kV single-phase distribution underbuild
	2. Description: 46 kV transmission with 12 kV 3-phase distribution underbuild
	Pole heights: 43' above grade (approximate)
Photograph Information	Date and time: 1/19/10; 2:32 pm
	Location: Route 100, Lowell (near quarries south of Village Road)
Technical Information	Software: Adobe Photoshop CS3

Appendix 6B. Visual Simulation of Proposed Transmission Lines

Kingdom Community Wind

+/- 61’ Above Grade, 3-Phase Distribution

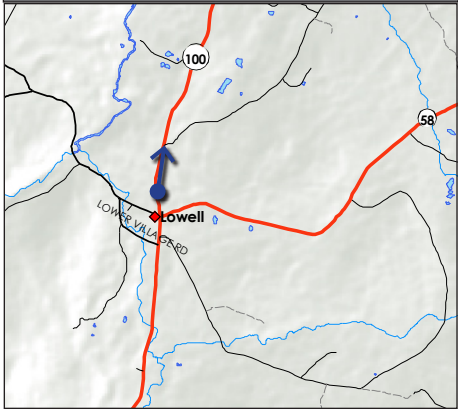


Note: These simulations are representative renderings for reference only (not specific to the locations shown) and may not depict the exact field conditions or actual construction details.

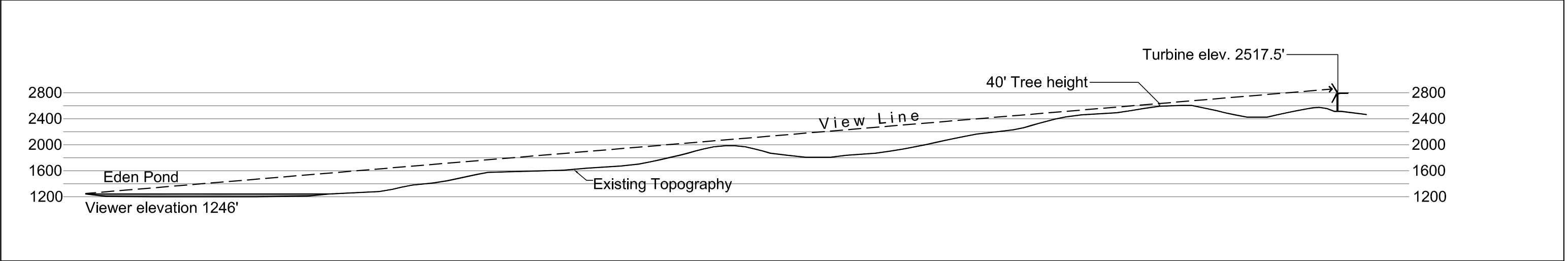
Existing Conditions Photograph



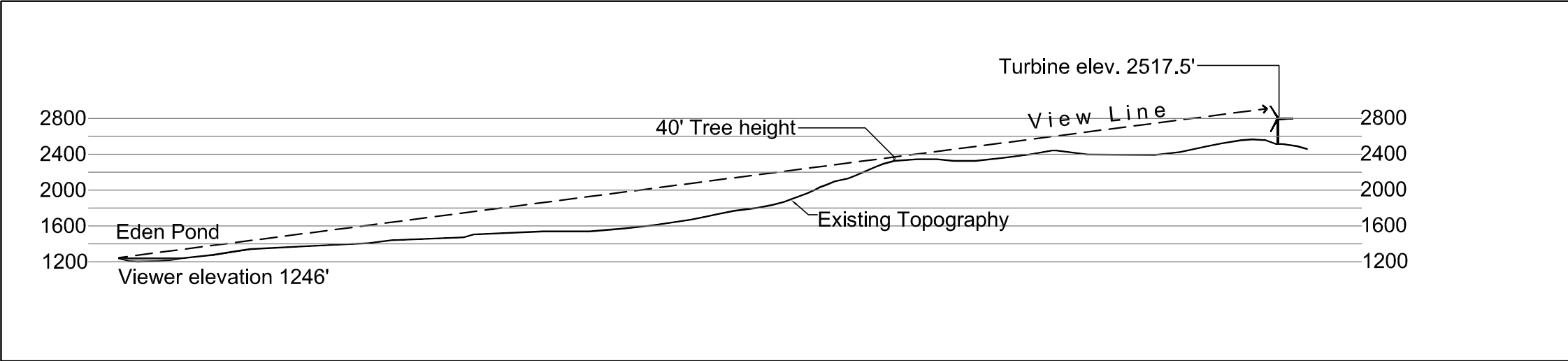
View Location Map



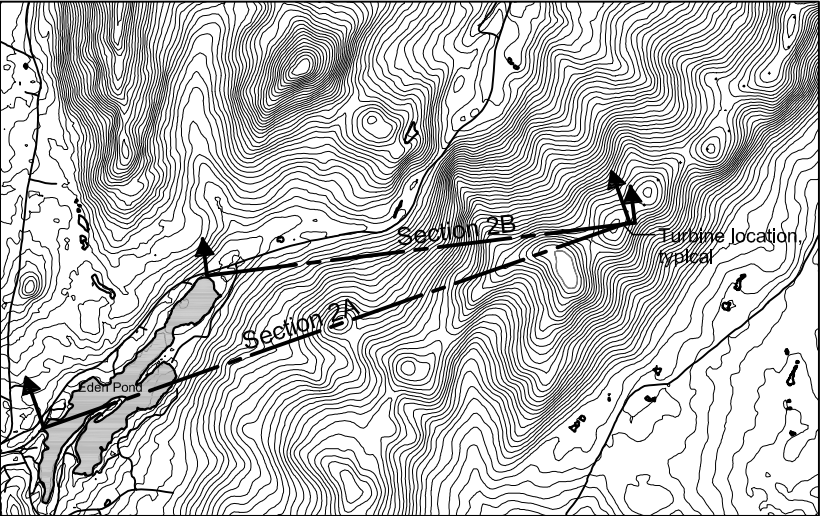
Simulation Information	
Transmission Line Information	Description: 46 kV transmission with 12 kV 3-phase distribution underbuild
	Pole heights: 61' above grade (approximate)
Photograph Information	Date and time: 1/19/10; 1:07 pm
	Location: Route 100, Lowell (across from substation)
Technical Information	Software: Adobe Photoshop CS3



Section 2A Eden Pond Historic Camps to Southern Turbine
Scale: 1" = 1500'



Section 2B Eden Pond Boat Launch to Southern Turbine
Scale: 1" = 1500'



Location
Scale: 1" = 6000'



Appendix 9A. Visual Simulation from Route 100, Westfield

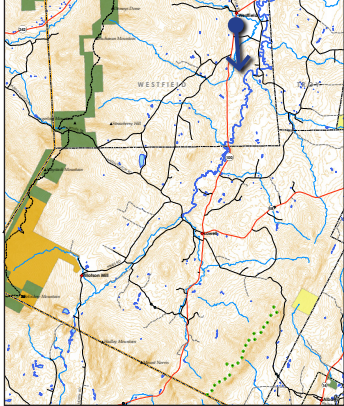
Kingdom Community Wind



Existing Conditions Photograph



View Location Map



Simulation Information

Turbine Information	Model: GE 2.5 MW
	Hub height: 278'-10" (85 m)
	Rotor diameter: 328'-1" (100 m)
Photograph Information	Date and time: 11/2/09; 1:32 pm
	Location: Route 100, Westfield; 44.885° N, -72.429° W
	Camera elevation above sea level: 792.3' (241 m)
	Focal length (35mm equivalent): 56mm
	Simulation viewing distance: 11" (27.9 cm)
Technical Information	Distance to nearest visible turbine: 8.1 miles (13.0 km)
	Software: ArcGIS 3D Analyst; Nemetschek VectorWorks 2008; SketchUp Pro 7; Adobe Photoshop CS3
Digital elevation data source: http://www.vcgi.org/dataware/	

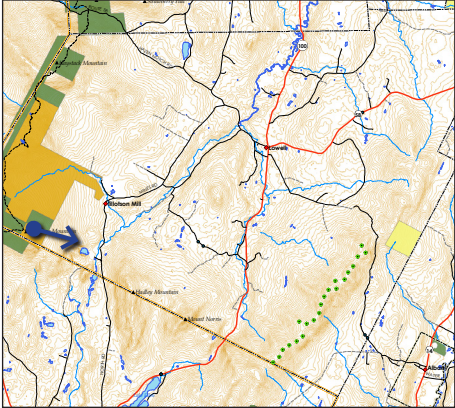
Note:
Simulation does not account for clearing, access roads and other project components



Existing Conditions Photograph



View Location Map



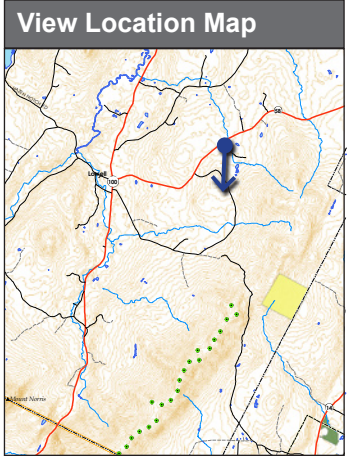
Simulation Information

Turbine Information	Model: GE 2.5 MW
	Hub height: 278'-10" (85 m)
	Rotor diameter: 328'-1" (100 m)
Photograph Information	Date and time: 10/17/09; 2:45 pm
	Location: Belvidere Mountain Fire Tower, Lowell; 44,773° N, -72.551° W
	Camera elevation above sea level: 3415' (1040 m)
	Focal length (35mm equivalent): 56mm
	Simulation viewing distance: 11" (27.9 cm)
Technical Information	Distance to nearest visible turbine: 6.0 miles (9.7 km)
	Software: ArcGIS 3D Analyst; Nemetschek VectorWorks 2008; SketchUp Pro 7; Adobe Photoshop CS3
Digital elevation data source: http://www.vcgi.org/dataware/	

Note:
Simulation does not account for clearing, access roads and other project components

Appendix 9C. Visual Simulation from Route 58, Lowell

Kingdom Community Wind

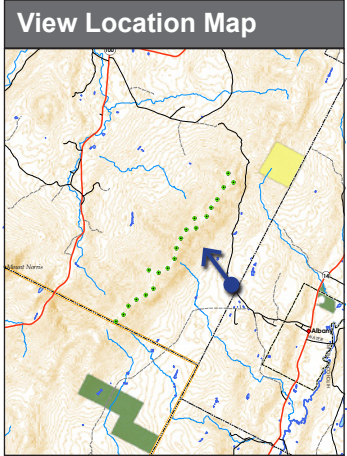


Simulation Information	
Turbine Information	Model: GE 2.5 MW
	Hub height: 278'-10" (85 m)
	Rotor diameter: 328'-1" (100 m)
Photograph Information	Date and time: 11/2/09; 2:44 pm
	Location: Route 58, Lowell; 44.81° N, -72.41° W
	Camera elevation above sea level: 1367' (417 m)
	Focal length (35mm equivalent): 56mm
	Simulation viewing distance: 11" (27.9 cm)
Technical Information	Distance to nearest visible turbine: 2.8 miles (4.5 km)
	Software: ArcGIS 3D Analyst; Nemetschek VectorWorks 2008; SketchUp Pro 7; Adobe Photoshop CS3
Digital elevation data source: http://www.vcgi.org/dataware/	

Note:
Simulation does not account for clearing, access roads and other project components

Appendix 9D. Visual Simulation from Bayley-Hazen Road, Lowell/Albany Town Line

Kingdom Community Wind



Simulation Information	
Turbine Information	Model: GE 2.5 MW
	Hub height: 278'-10" (85 m)
	Rotor diameter: 328'-1" (100 m)
Photograph Information	Date and time: 11/2/09; 3:55 pm
	Location: Bailey Hazen Rd. Lowell; 44.741° N, -72.405° W
	Camera elevation above sea level: 1478' (451 m)
	Focal length (35mm equivalent): 56mm
	Simulation viewing distance: 11" (27.9 cm)
Technical Information	Distance to nearest visible turbine: 1.2 miles (1.9vx km)
	Software: ArcGIS 3D Analyst; Nemetschek VectorWorks 2008; SketchUp Pro 7; Adobe Photoshop CS3
Digital elevation data source: http://www.vcgi.org/dataware/	

Note:
Simulation does not account for clearing, access roads and other project components

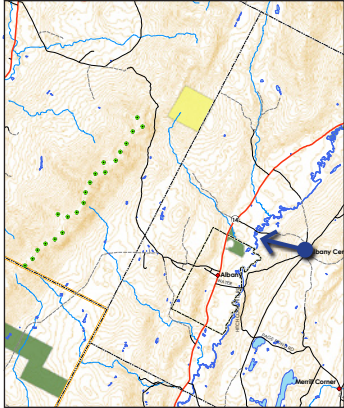
Appendix 9E. Visual Simulation from Albany Center Kingdom Community Wind



Existing Conditions Photograph



View Location Map



Simulation Information	
Turbine Information	Model: GE 2.5 MW
	Hub height: 278'-10" (85 m)
	Rotor diameter: 328'-1" (100 m)
Photograph Information	Date and time: 11/2/09; 3:17 pm
	Location: Albany Center; 44.737° N, -72.35° W
	Camera elevation above sea level: 1291' (393 m)
	Focal length (35mm equivalent): 56mm
	Simulation viewing distance: 11" (27.9 cm)
Technical Information	Distance to nearest visible turbine: 3.5 miles (5.6 km)
	Software: ArcGIS 3D Analyst; Nemetschek VectorWorks 2008; SketchUp Pro 7; Adobe Photoshop CS3
Digital elevation data source: http://www.vcgi.org/dataware/	

Note:
Simulation does not account for clearing, access roads and other project components

Appendix 9F. Visual Simulation from Lowell Elementary School, Lowell

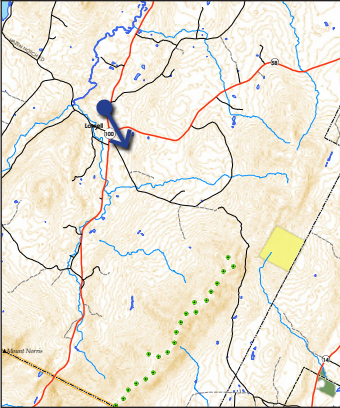
Kingdom Community Wind



Existing Conditions Photograph

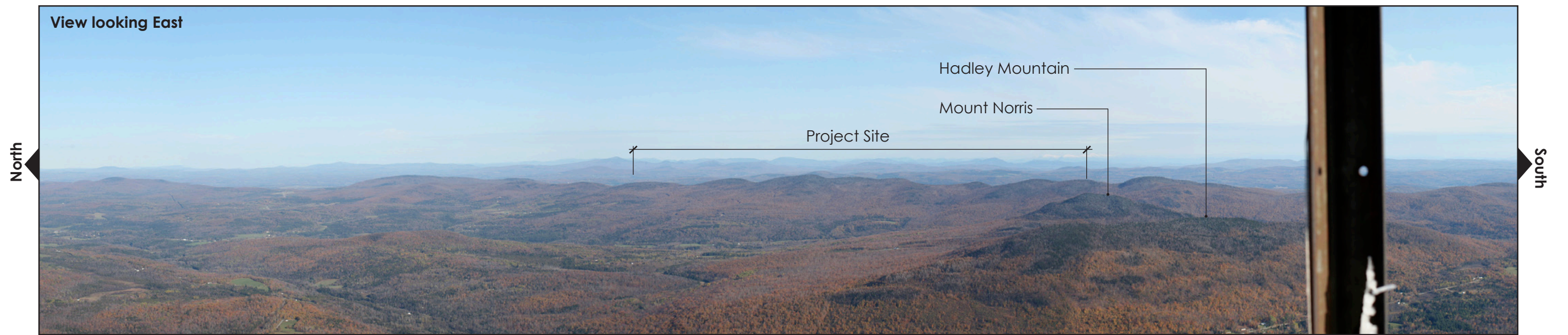
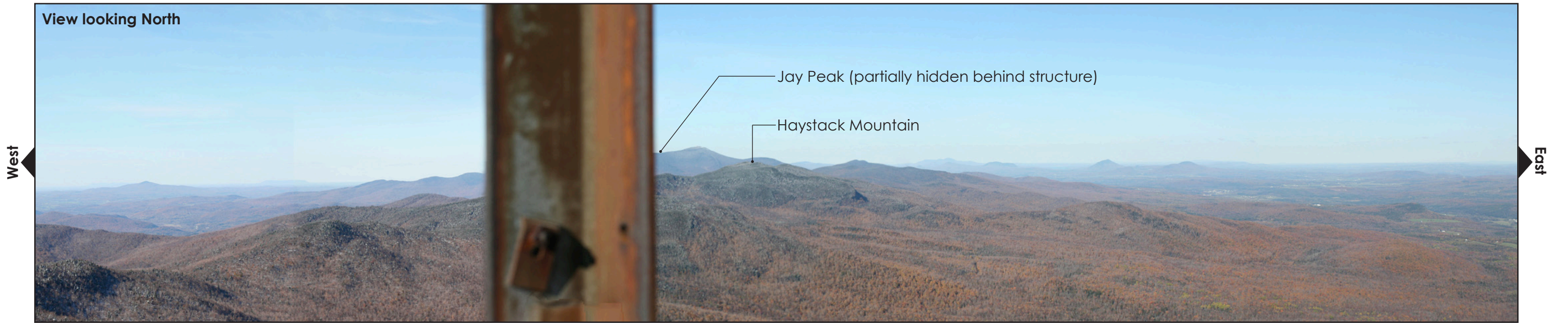


View Location Map



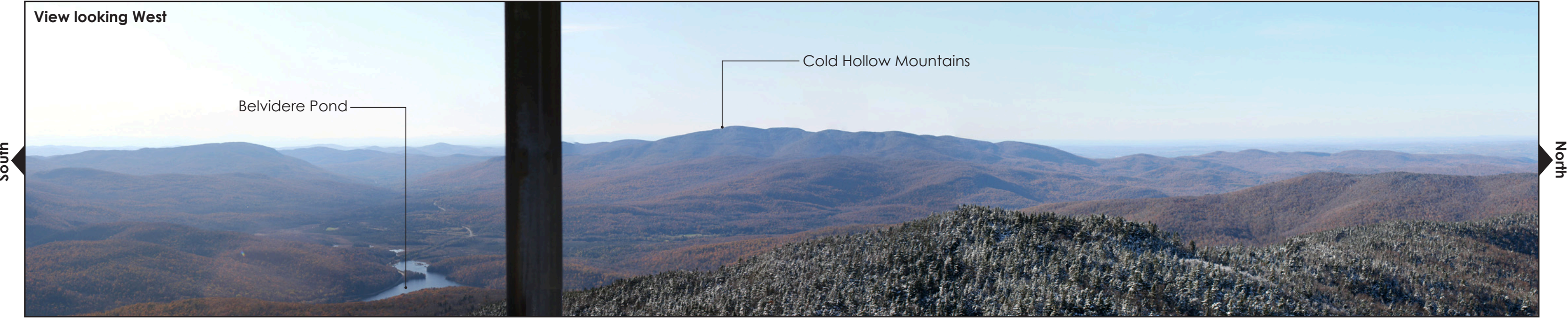
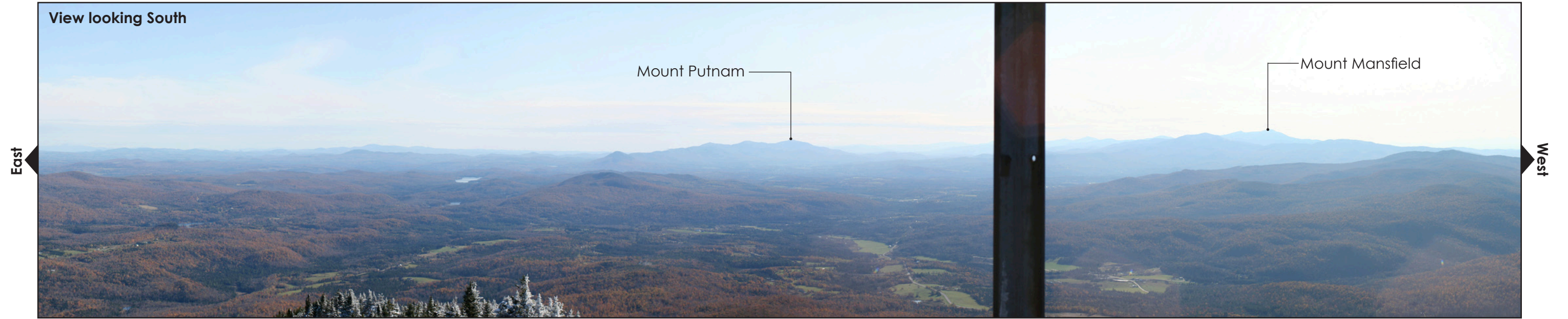
Simulation Information	
Turbine Information	Model: GE 2.5 MW
	Hub height: 278'-10" (85 m)
	Rotor diameter: 328'-1" (100 m)
Photograph Information	Date and time: 5/7/10; 12:16 pm
	Location: Lowell Elementary School, Lowell; 44.81° N, -72.45° W
	Camera elevation above sea level: 1022' (312 m)
	Focal length (35mm equivalent): 56mm
	Simulation viewing distance: 11" (27.9 cm)
Technical Information	Distance to nearest visible turbine: 3.2 miles (5.1 km)
	Software: ArcGIS 3D Analyst; Nemetschek VectorWorks 2008; SketchUp Pro 7; Adobe Photoshop CS3
	Digital elevation data source: http://www.vcgi.org/dataware/

Note:
Simulation does not account for clearing, access roads and other project components



360 Degree Panorama





360 Degree Panorama



Appendix 11. Regional and Town Plan Excerpts

2008 MUNICIPAL DEVELOPMENT PLAN
FOR
TOWN OF BARTON
BARTON VILLAGE & ORLEANS
VILLAGE



Planning Commission Hearings:

1/17/08

**Select Board Hearings: 5/22/08,
 7/21/08, 9/25/08**

Town Vote:

11/04/08

The Town Plan proposes no additional protection to wetlands beyond that provided by the State and Federal Regulatory Agencies.

It is the intent of the Town plan to notify the citizens of Barton to be generally aware of wetland regulations and to obtain the proper state/federal determinations before filling or dredging a possible wetland area. It is, however, recommended that zoning districts be defined with appropriate regard for designated, mapped and protected wetland areas. Copies of National Wetlands Inventory Mapping is available for viewing at the Town Clerk's office.

It is also noted that significant protected wetland areas may exist that is not fully or correctly delineated on the national Wetland Inventory Mapping. Landowners should verify these locations prior to commencing any land development which might impact these protected areas. State and Federal Laws provide for severe fines for unlawful filling, dredging or harmful alteration of protected Wetlands.

D. NATURAL RESOURCES, PUBLIC LANDS, RARE AND IRREPLACEABLE NATURAL AREAS, SCENIC AND HISTORIC FEATURES AND RESOURCES.

Overview:

It is clear that the Town's natural resources serve as a strong tourist and recreational attraction. Tourism will likely serve as one of the Town's leading economic industries for the foreseeable future. For this industry to survive, the Town's natural resources must survive. These resources include Crystal Lake, Baker Pond, May Pond, Wheeler Mountain, May Hill, Barton Mountain, the Lee Emerson Memorial Forrest, and Crystal Lake State Park (listed on the National Registry of Historic Places), all of which contribute to the unique scenic beauty of the area. Forestry abuses and man-made pollutants can threaten these resources. The town's residents should have a general awareness of how these resources are critical to the town's economy and environment.

The town residents and general public utilize and access the town's natural resources in a number of ways. It is important to identify these resources and measures implemented to provide access to them. The state Fish and Wildlife Department has taken steps over the years to provide public access to public waters. These include developed boating access on Crystal Lake, and May Pond, and undeveloped boating access on Baker Pond, one developed angler parking area on the Barton River, one at the confluence of the Willoughby and Barton Rivers, and one at Willoughby Falls. Over 130 acres of Willoughby Falls Wildlife Management Area are in Barton. Also, during the 1950's and '60's, the Department of Fish and Wildlife acquired significant amount of stream bank land to provide fishing access and create a greenbelt along certain rivers. These include both banks of the Barton River for about 40% of its stream length in the Town, one bank of the Barton for over 10% of its Town's stream length, both banks of the Willoughby Falls are also in State ownership. It is well established that the Willoughby Falls springtime fishing contributes significantly to the local economy.

To meet the electrical needs of the Town and to supplement necessary reserves on hand, the two electrical departments for both Orleans and Barton Villages have drawn on the New England power grid. Both departments received public approval in 1991 to undertake long term power purchases from Hydro-Quebec. Barton Village also meets much of its current power needs from its own power generation facility in West Charleston (several attempts by Barton Village to sell the West Charleston facility in the 1990's were unsuccessful). Barton Electric recently completed improvements and repairs to the facility as well as improvements on its transmission lines. Plans to repair or replace an older second generator at the facility, are currently underway. Upgrades and repairs to existing infrastructure are ongoing in both Villages.

In the past, both Barton and Orleans Electric have experienced high line losses due to the poor condition of the distribution system. However, over the past several years many new power lines and poles have been installed to combat this problem. Most recently, Barton and Orleans are in the process of upgrading the ~~25~~ 45 kV transmission line between the two systems. The cost of these ongoing improvements may be higher than the ratepayers are willing to pay. Maintaining sufficient capital improvements is an ongoing problem, especially for small-scale systems. The result has been higher residential electric bills. Because of their small customer base, the per customer cost of regulatory compliance for both Barton Electric and Orleans Electric is high. As regulatory requirements grow, a disproportionate amount of compliance cost will be passed on to the residential customer relative to the larger utilities (CVPS, GMP, VEC, etc.) which have greater economies of scale and a more diversified customer base. This will continue to be an ongoing problem for both electric companies for the foreseeable future. Hydro Quebec, although a fairly new contracted source of power, has also experienced rate increases over the last few years. If that contract is subsequently cancelled, the Town could face a serious supply shortage of power in the near future.

Both Orleans and Barton Electric are members of the Vermont Public Power Supply Authority (VPPSA). The VPPSA assists its members with power supply purchase contracts necessary to meet municipal needs, and also with financial monitoring and billing services.

The Planning Commission recognizes the importance of renewable energy resources and recommends their development and use within the Town. These would include the use of wood and solar heat, solar electricity, small residential wind generating facilities, bio-based energy, and small hydro electric production. At the time of this writing, many towns across Vermont are re-visiting the feasibility of small hydro electric production. Pursuant to this, the Planning Commission encourages Barton Village to investigate the feasibility of installing small hydro at Crystal Lake Falls to supplement its current generating capacity.

Industrial wind power companies have recently identified areas in northern Caledonia County as optimum locations for the development of commercial wind power generation facilities. These designated areas are located in the neighboring towns of

TOWN OF EDEN TOWN PLAN 2007

FINAL ADOPTED VERSION

Scenic resources

Residents and visitors do not have to go far to find the scenic resources in Eden. A drive on almost any road, a walk on the Long Trail, an afternoon canoeing on any of the lakes and ponds in town brings you to a multitude of scenic vistas and views. There is a postcard around every corner in town.

While Eden could identify every meadow and forested ridge as a scenic resource worthy of consideration for protection, the Planning Commission chose the most important areas for special consideration. The highest priority scenic resources are (See Historic, Scenic, and Archeological Resources Map):

- The State highways (Routes 100 and 118). So much of a town's image comes from those areas that are most traveled. Working to maintain an attractive highway landscape will show Eden as an attractive place to live and locate a business. The Historic, Scenic, and Archeological Resources Map shows some stretches of highway that are of particular scenic value.
- The three major lakes (Belvidere Pond, South Pond, and Lake Eden). Without a doubt, our ponds and lakes have outstanding scenic quality. From the wild undeveloped shores of Belvidere Pond to the rustic camps lining Lake Eden, our lakes and ponds offer picturesque views from the shores as well as from a boat.
- The Green River Reservoir (GRR) Viewshed. The GRR is the largest non-motorized lake in the State of Vermont. Its wilderness-like character is such that the Town of Hyde Park has adopted a special district to protect development on private land within view of the water. This project won state recognition for its creativity and public participation in its development. It has support of both the landowner groups as well as the *Friends of the Green River Reservoir*, a private group of concerned

citizens. Of concern is that the portions of the viewshed in Eden are not equally protected. If zoning is considered for Eden in the future, rules similar to Hyde Park's should be considered for Eden's portion of the viewshed.

There are also an equal number of threats to these scenic resources. Telecommunication towers, junk cars, poorly planned or located development, and, some would say, wind towers all could negatively impact scenic resources in town. Eden will need to consider its policies carefully with respect to scenic resources, once spoiled they can be difficult to replace or repair.

On the other hand scenic resources, while valued by residents and visitors alike, are difficult to regulate. Eden values its many beautiful vistas, forested hills, and open fields but it would be unfair to deny the right to develop based on the appearance of someone's property from a roadway. The Planning Commission, Selectboard, and residents will need to take each case individually and carefully consider the best approach. In some cases, like junk cars, a specific ordinance requiring fences and screening may be the best approach, while in other cases the town may need to count on the good judgment of its residents to be respectful of others and develop their properties appropriately.

Archeological resources

Archeological sites contain a fragile, complex and irreplaceable record of past human activities. Archeological sites differ from historic sites in that the information that exists is buried. For 10,000 years Native American persons focused their activities within river valleys and lake basins. Evidence of prehistoric activities and occupations are contained within soil deposits of a cornfield or woodlot or are buried in a floodplain. Any prehistoric archeological sites

VII. UTILITIES & ENERGY PLAN

Energy sources

Energy plans generally group discussions into three areas: electricity, heating and transportation.

Electricity. Electricity can be generated from a variety of sources including hydro, nuclear, and fossil fuels (coal, oil, and natural gas). Other potential sources of electricity include solar, wind, biomass (wood burning), and methane recovery (from landfills and farms).

There are no electricity generating facilities in Eden therefore all electricity is purchased from other places. Each of the three electricity providers discussed below purchase for their customers from a variety of sources including hydro (regionally and Quebec), nuclear (Vermont Yankee), and biomass (McNeil wood burning facility in Burlington).

Future hydro-generating facilities are not expected in the region and none are anticipated for Eden. Commercial wind towers, on the other hand, have a high potential for occurring in Eden due to the topography and elevation. According to wind charts for the state produced by *Vermont Department of Public Service*, Eden has Class 6 and 7 wind zones which are sought for commercial wind farms. These areas are generally found at higher elevations (over 2,500 feet) and along north to south ridgelines. In Eden this includes: the higher slopes of Belvidere Mountain; the summit of Bowen Mountain in the Green Mountain Range in the west of town; Hadley Mountain between North Road and Route 100; the continuation of the Lowell Ridge line in the eastern part of town south to East Hill Road; and the summits of Bean Mountain and an unnamed hill in the southeast corner of town. There were no less than four potential “strings” that could be constructed in town. A string is a series of wind towers aligned to maximize power generation. No other town in Lamoille County has the potential for wind development

that Eden has. Most other communities lack the number of locations and the classification of wind and the other communities with this resource cannot capitalize on it because of conflict with recreation (Long Trail and Ski resorts along the Green Mountains) or the visibility of ridge line (Worcester range).

Eden, as a community, must decide whether they want to allow these types of structures in town and, if so, where. On the plus side, they generate quiet and clean power; add a great amount of value to the grand list (thereby lower tax rates); and can be an attraction for tourists. On the negative side they are very big (300+ feet tall not including the blades); they can disturb wildlife as they are generally located in remote locations; they are considered by many to be unsightly and a mar to the landscape; and, if someone lives close by, they generate some noise.

Certain locations are obviously out. The Green Mountains are home to the Long Trail and wind farms would conflict with the recreation. They are also very visible and would therefore be less attractive to wind development. The wilderness like Green River Reservoir would likely rule out the south eastern locations as well from commercial consideration. Hadley Mountain and the ridgelines in the east are the most likely candidates for the town to consider for allowing such structures.

There are also areas in town where private wind generation may be possible and this should be encouraged provided safety and aesthetic considerations are met.

Heating. The heating of homes and businesses is an important sector in energy plans especially in northern Vermont. One locally renewable source for heat in Eden is wood. Solar power has also been used efficiently to heat water which is another component of home heating. Other sources of home heating fuel include oil, liquid propane gas (LP), kerosene, and electricity.

According to the 2000 Census, Eden residents relied

demand for transportation can be influenced by the location and type of roads provided, convenience of services and facilities, structuring of routes for school buses, and the siting of new residential development. The average commuter from Eden, for instance, spends 32 minutes driving to work each day and 81% drive alone. Carpooling and other efforts can save money, time, and energy for residents of Eden.

Partners for implementing this chapter

For the most part implementing the energy plan comes down to efficiency and energy conservation. This is typically the responsibility of the energy consumer to use less energy but occasionally there are a few incentives. The State recently mandated that all demand side programs now be handled by an energy efficiency utility called **Efficiency Vermont**. This new utility offers a wide variety of services, incentives, and advice on energy conservation for small users.

One area where the town clearly has a role in implementing this energy plan is in the planning for commercial wind farms. This plan does not, at this time, advocate or oppose commercial wind farms although it recognizes that certain areas are likely inappropriate due to visual and recreational conflicts. The **Planning Commission**, **Selectboard**, and **interested citizens** should seriously investigate this question before a proposal arrives for consideration. The results of the study could steer projects towards Eden or away depending on the Town's opinion on the towers.

If regulations are proposed in the future the **Planning Commission** should exempt or provide some special provisions for regulating the construction of minor alternative energy facilities such as photovoltaic panels, solar water heaters, and the like. The bylaws should also reflect that many electric producing facilities are exempt from local zoning. In these situations the **Selectboard** should

participate in the "section 248" hearing to ensure local concerns are met.

Section 248 reviews are very similar in scope to Act 250 hearings except that they are used for projects that require a Certificate of Public Good from the **Public Service Board (PSB)** such as power plants and transmission lines. The policies contained in this plan are considered by the PSB in making their decisions.

2000 Planning Commission survey results

The 2000 survey did not discuss energy or electric utilities. A survey of residents on the topic of commercial wind farms is highly recommended to determine interest for or against such structures.

Goals, Policies, & Recommendations

Energy is a critical component of economic development and global environmental concerns. The State of Vermont has had varying success in achieving the goals of clean, reliable, and renewable energy. Energy for electricity used in town is generated primarily from renewable sources while energy for transportation is almost exclusively non-renewable. Residents do not have the option to change some of these sources of energy but everyone can save money and energy by using efficient appliances and vehicles or conserving power by turning off unused equipment.

GOALS

- For citizens to generate energy locally from renewable sources, whether for heating, electricity, or transportation.
- Energy should be provided in a safe, reliable, and efficient manner.
- To promote energy efficiency and conservation in the design construction and use of municipal, commercial,

GLOVER TOWN PLAN

***ADOPTED
JUNE 7, 2006***

Goals, Objectives, and Strategies

- Glover should develop a Town Ordinance relating to the erection of cellular and other telecommunication towers and/or transmitters incorporating, at a minimum, the following: aesthetics, integrity of residential zones, ridgeline protection, preferred locations (general and specific), and collocation or clustering of tower facilities.
- Town wide access to broadband internet access via the Rural Broadband project will be pursued.

Waste Disposal

Currently most waste goes to Waste USA in Coventry, with trash pickup done by private haulers. Twice a year a hazardous waste disposal is held in Coventry. The Town covers the expense for all participating town residents. Scrap metal days are held locally.

Present Conditions

- After an initial eighteen-month trial, membership in the NEK Solid Waste Management District, Glover voted to withdraw from the organization in favor of organizing and managing our own waste management system.
- In 1989 a Comprehensive Waste Management Plan was implemented. It is managed by the Glover Recycling Committee and financed with municipal funds, state and federal grants, and user fees.

Goals, Objectives, and Strategies

- Explore options for annual drop-off dates for disposal of computer and other electronic equipment.
- Locate a stump dump, demolition debris and organic waste composting site.
- Add waste oil collection capacity to the recycling center.

Emergency Services

Independent non-profit corporations operate a Volunteer Fire Department and Volunteer Ambulance Service, operating with separate charters. Projected rates of population increase are quite low. These two services are dispatched by the Derby State Police, under the auspices of the State of Vermont E-911 system.

Survey Snapshot

Survey respondents favored increased safety regulation and/or enforcement in the following areas:

	Response Total
Speeding	80
Vandalism	66
Theft	59
Animal control	33
4-wheelers and ATV use	13

Section 8. Energy Plan

All of the energy needs of the Town presently appear to be met. There are no documented scarcities of energy resources in Glover. Energy costs are comparable to those of surrounding towns. However, gasoline prices and heating oil prices are

Survey Snapshot

When asked about needs, cost issues, or problems with any of the following energy sources, survey respondents indicated accordingly:

Heating Oil	43
Gasoline/Diesel	33
Electricity	31
Propane	23
Wood	15
Other	5
Total responding	66

Nearly ALL of these issues were indeed related to cost.

increasingly putting a strain on residents. There do not appear to be any immediate chronic problems with resource scarcity or rising costs, although the current world oil market could alter that equation quickly in the foreseeable future.

According to the most recent Public Service Board report, nearly all of Glover is served by Vermont Electric Cooperative (VEC). Municipal electric companies and Washington Electric Cooperative also have minor easements in the southernmost sections of town. The most recent comparative statistics from the Department of Public Service show Citizen's – VEC's predecessor – to have the third highest electric rates in Vermont.

Table 8.1: Vermont Utilities -- Typical Residential Bills as of November 2002*

CVPS	\$101.56
Enosburg	\$100.28
Citizens	\$97.84
GMP	\$96.84
Hardwick	\$94.33
Barton	\$91.71
Jacksonville	\$84.14
Hyde Park	\$75.26
Burlington	\$71.13
Johnson	\$56.54

**Based on 750KWh.*

Source: Vermont Department of Public Service Biennial: July 1 2000 – June 30, 2004

The Planning Commission recognizes the importance of renewable energy resources and recommends their development and use within the town. These would include the use of wood and solar heat and solar, small hydro, small wind-generating facilities, and bio-based energy production.

GREENSBORO

TOWN PLAN



February
2007

Selectboard

Peter Gebbie (chair)
Anne Stevens
Jefferson Tolman

Greensboro Planning Commission

Ralph Boyd
Phil Gray
Kim Greaves
Josh Karp (chair)
Linda Romans
Willie Smith

H. Utilities and Facilities Goals

The Town of Greensboro adopts the following utilities and facilities goals:

1. to ensure that any construction, expansion, or repair of utilities and facilities will not harm the town's rural character or aesthetics;
2. to ensure our recycling program is adequate to meet resident's needs.
3. to ensure existing public and privately owned wastewater infrastructure, including septic systems, do not degrade our environment;
4. to utilize the town hall to its fullest potential.
5. to ensure adequate fire protection capability for the town.

I. Utilities and Facilities Policies

The Town of Greensboro shall:

1. maintain the existing capital improvement plan and budget to schedule maintenance and improvements of all town owned buildings and facilities;
2. support the construction of infrastructure that increases Greensboro's energy independence and promotes renewable energy sources;
3. support the construction of infrastructure that improves telecommunications and internet access so long as the integrity of the skyline is maintained to the maximum extent possible;
4. seek grant funding to study the feasibility of a municipal sewer system to allow a compact village settlement pattern in the two village districts and Lakeshore District, achieve several of this plan's goals, and help improve ground and surface water quality;
5. support construction of a new fire station adequate to the needs of the Greensboro community.

A. Energy Goals

The Town of Greensboro adopts the following energy goals:

1. to promote energy conservation among our residents, commercial owners and visitors;
2. to promote expanded use of small-scale renewable energy resources in the public and private sectors

B. Energy Policies

In order to achieve the above energy goals the Town of Greensboro shall:

1. undertake energy audits of town owned buildings and establish a time schedule, in the Town's Capital Improvement Plan or elsewhere, to complete the needed improvements;
2. build all of its structures using the highest, reasonably feasible methods of energy efficiency;
3. inform all residential contractors that interact with the town through the permitting processes about the Vermont Residential Energy Code;
4. ensure that the Town's zoning bylaw allows for and encourages construction of alternative energy structures, such as solar, wind, and hydro;
5. support the Town Energy Committee in its efforts to create small-scale renewable energy projects in Greensboro.

TOWN OF HYDE PARK, VERMONT

MUNICIPAL DEVELOPMENT PLAN 2005

Adopted: November 18, 2005

Regionally Approved: July 12, 2005

This Plan was compiled by:
Hyde Park Planning Commission

Maps and technical information were provided by:
Lamoille County Planning Commission

Development of plan funded in part by a Municipal Planning Grant awarded by:
Agency of Commerce and Community Development

Policies

Wastewater disposal

- Until the time that the state assumes the responsibility of permitting wastewater treatment facilities, all systems must be approved by the health officer before construction begins.
- Conventional septic fields are not permitted on slopes greater than 20%.

Water supply

- Any new water supply must meet state water supply rules including isolation distances.

Solid waste

- All projects should provide for adequate removal of solid waste.
- Backyard burning of trash is prohibited.

Public safety

- The town supports the public safety activities of the Hyde Park and North Hyde Park Fire Departments and NEMS.
- All development should be accessible to emergency vehicles.
- Large developments should include fire ponds and dry hydrants to aid in fire fighting, if similar resources are not available nearby.

Recreation

- Hyde Park supports local land owners who generously keep their lands open to traditional recreational uses such as hiking, hunting, and fishing.

Telecommunication facilities

- In order to minimize tower proliferation, it is the policy of the town to encourage applicants to exhaust all reasonable options for sharing space on existing towers or tower sites prior to proposing new tower sites and related facilities. In making such a determination on the feasibility of co-location, proposers shall evaluate space available on existing towers, the tower owners ability to lease space, geographic service area requirements, mechanical or electrical incompatibilities, the comparative costs of co-location and new construction, and regulatory limitations.
- One of the town's principal scenic qualities is its ridgelines and mountainsides. These areas are significant contributors to the maintenance and enjoyment of rural character. These ridges are predominately undeveloped and provide an unbroken skyline when

viewed from the valley floor. The use of the town's ridges for telecommunication towers and related facilities needs to be undertaken in a manner that will not unduly detract nor adversely affect these scenic values. Accordingly, protection of these areas from insensitive developments is a matter of public good. To minimize conflict with scenic values, facility design and construction shall employ the following principles:

- a. where feasible, be sited in areas not highly visible to the traveling public, or from residential areas, historic districts, and public use areas or outdoor recreation areas such as hiking trails;
 - b. be located in forested areas or be sufficiently landscaped to screen the lower sections of towers and related ground fixtures from public vantage points, such as trails, roads or water bodies;
 - c. utilize materials, architectural styles, color schemes, lighting fixtures, mass and other design elements to promote aesthetic compatibility with surrounding uses and to avoid adverse visual impacts;
 - d. where prominent views of a site exist, be located downgrade of the ridge so as not to exceed the elevation of the immediate ridge;
 - e. where construction of access roads are involved, to minimize visibility, be situated to follow the contour of the land and to avoid open fields or meadows;
 - f. avoid peaks and ridges which function as regional focal points;
 - g. No external lights;
- In planning for telecommunication facilities, consideration shall be given to the environmental limitations of any given site. Impacts of the use on wildlife habitats, soil erosion, forestry and agricultural lands, and similar resources should be carefully addressed. Projects that materially impact these resources shall be discouraged.
 - Towers, antennae and related fixtures that fall into disuse, or are discontinued shall be removed by the facility owner to retain the values set forth above. Owner may be required to post bond for removal.
 - Continue and expand communications between local departments, councils, associations and elected officials in order to better coordinate planning to serve needs for facilities and services.

III. UTILITIES & ENERGY PLAN

Energy Sources.

Energy plans generally group discussions into three areas- electricity, heating, and transportation.

Electricity. Electricity can be generated from a variety of sources including hydro, nuclear, and fossil fuels (coal, oil, and natural gas). Other potential sources of electricity include solar, wind, biomass (wood burning), and methane recovery (from landfills or farms).

There are two hydro-power producing installations in town: the Sanders Plant, owned by the Morristown Water and Light Department on the Green River Reservoir, and the Woodside Plant on the Gihon River. Neither of these plants will be covered in this section because they are not owned by the Town of Hyde Park.

Most of the electricity used in Hyde Park is not generated in the area. Each of the five energy providers discussed below purchase power for their customers from a variety of sources including hydro (local and Hydro-Quebec), nuclear (Vermont Yankee), and biomass (McNeil wood burning facility in Burlington).

Future hydro-generating facilities are not being planned although sites with potential for power production have been identified in the past and may be of interest in the future (*Potential for hydropower development at existing dams in New England*. Volume VIII- State of Vermont by New England River Basin Commission, January 1980). Wind towers at a commercial scale are also not likely due to the lack of a steady wind in town. According to wind charts for the state produced by *Vermont Department of Public Service*, Hyde Park has only Class 1 and 2 wind zones. Wind classes of 6 and 7 are generally sought for commercial wind farms. These areas are generally found at higher elevations (over 2,500 feet) and along north to south ridgelines. There may be areas in town where private wind generation may be possible and this should be encouraged provided safety and aesthetic considerations are met.

Heating. The heating of homes and businesses is an important sector in energy plans especially in northern Vermont. One locally renewable source for heat in Hyde Park is wood. Solar power has also been used efficiently to heat

Transportation currently accounts for 46% of the total energy demand in Vermont, and is predicted to account for 1/3 of the increase in energy demand by 2010. Energy demand for transportation can be influenced by the location and type of roads provided, convenience of services and facilities, structuring of routes for school buses, and the siting of new residential development.

GOALS, POLICIES, AND RECOMMENDATIONS

Energy is a critical component of economic development and global environmental concerns. The town of Hyde Park and the State have had varying success in achieving the goal of clean, reliable, and renewable energy. Energy for electricity in town is generated primarily from renewable sources while fuel for transportation is almost exclusively non-renewable. Residents do not have the option to change some of these sources of energy but everyone can save money and energy by using efficient appliances and vehicles or conserving power by turning off unused equipment.

Utilities and Energy Goals

- For citizens to generate energy locally from renewable sources, whether for heating, electricity, or transportation.
- Energy should be provided in a safe, reliable and efficient manner.
- To promote energy efficiency and conservation in the design, construction, and use of municipal, industrial, commercial, and residential structures.

The Town's three goals above address Hyde Park's future energy sources, providers, and consumers. The policies and recommendations below offer some avenues to achieve these goals.

Policies

- Hyde Park supports its residents in using wind and solar to generate electricity locally provided scenic and aesthetic concerns are addressed.
- Commercial wind generating facilities are not supported within Hyde Park especially within the Green River Reservoir viewshed.
- All planning for power transmission lines should be strongly weighed in favor of underground placement to achieve scenic objectives of this plan.
- The town should use energy efficient appliances and materials in municipal facilities.

X. SCENIC & HISTORIC RESOURCES

Special features that reflect the cultural development and character of the Town include its historic sites, buildings, districts, and scenic areas. The visual character of our community is valued by residents and visitors alike.

Scenic Resources.

Scenic resources include natural scenes or a mixture of natural and manmade elements such as houses, roads, and farms.

There is much natural beauty in the community which contributes to the quality of life of residents and is appealing to its visitors. A drive on almost any of the roads in town puts the observer in contact with active farmland, pasture, hills, forests, historic buildings and views of the nearby mountains, rivers, and streams.

Hyde Park's scenic resources have not been inventoried. Future efforts to protect scenic resources require the development of criteria for evaluating a specific scenic area. Such criteria should be as objective as possible and be locally developed with participation by members of the community. The first of these areas should be the Green River Reservoir. This area has been identified as a unique place with a wilderness character. Maintaining this experience into the future will require forethought and planning.

Historic Resources.

Historic Districts and Structures. In 1981 the entire town was inventoried by the state Division of Historic Preservation for the Vermont state historic registry. Town-wide, 28 structures and two districts (the Village of Hyde Park and the village of North Hyde Park) were noted for their historic value. Most of the buildings noted in this inventory were constructed in the mid 1800s to the early 1900s, and provide examples of the popular architectural styles of this period.

Archeological Sites. Hyde Park contains an archeologically sensitive corridor associated with the Lamoille River valley. Federal and state laws protect archeological sites. Developers planning to work in the potentially sensitive corridor should contact the Vermont Department of Historic Preservation while in the early planning stages of a project to determine whether the location of a proposed project could have an impact on a significant archeological site.

Town of Johnson Municipal Development Plan 2006 - 2010

Adopted by the Selectboard on August 21, 2006

This Plan was prepared by:
The Johnson Planning Commission

The planning process was coordinated by:
Lea Kilvadyova, Community & Economic Development Coordinator

Maps and technical assistance were provided by:
The Lamoille County Planning Commission

Development of the Plan was funded through a grant from
The Municipal Planning Grant Program awarded by:
The Agency of Commerce and Community Development

Commission. Planning will take into consideration infrastructural needs of Johnson's educational institutions (trails, sidewalks, open spaces for recreation and an information booth).

- Develop management plans for all publicly owned lands and facilities.
- Promote energy efficiency and conservation in the design, construction, and use of municipal, industrial, commercial, and residential structures.
- Support efforts to generate energy locally from renewable sources, whether for heating, electricity, or transportation.

Task

- Review the existing on-site sewage ordinance in light of the revised State Regulation of Wastewater Disposal and Water Supply Rules (*Select Board*).

Land Use

Policies

In the area of Land Use the Town of Johnson will:

- Manage growth and development in a manner that is respectful of Johnson's rural character, natural resources and their environmental, recreational and economic functions, and its infrastructural capacity.
- Support Village's efforts that encourage and expand the diversity and vitality of the Village as the cultural, single family residential and commercial-service hub of the Town.

Tasks

- Utilize existing development controls and state regulatory proceedings in an effort to implement the vision, and address the needs, conclusions and policies of this plan (*Select Board and Johnson Planning Commission*).
- Define future land use districts. Within those districts, identify areas and properties that are developable as well as areas to be protected from development. Follow up by drafting subdivision and zoning bylaws (*Johnson Planning Commission*).
- Develop an unregistered vehicle and junkyard ordinance (*Select Board*).

Lamoille County, Vermont
Regional Plan
2006 – 2011
Adopted: November 28, 2006
Effective: December 29, 2006

Document 1 of 2:

Policy and Implementation

Prepared by:
The Lamoille County Planning Commission
P.O. Box 1009
Morrisville, VT 05661
(802) 888-4548
www.lcpvvt.org

the electricity used in Lamoille County is, therefore, not generated in the area.

Each of the electricity providers discussed in the Utilities chapter purchase power for their customers from a variety of sources including hydro (local and Hydro-Quebec), nuclear (Vermont Yankee), and biomass (McNeil wood burning facility in Burlington). Most of the power used in the state and the region are renewable or do not generate greenhouse gas emissions (nuclear). Only a small fraction of the purchased power is from fossil fuels – primarily natural gas.

Future hydro-generating facilities are not anticipated because most of the environmentally sound and economically effective sites have been developed. Potential does exist for a moderate expansion of hydro-power through improved turbines at existing facilities but this will not dramatically increase the local contribution to the grid.

Generating electricity from wind is a likely area to increase regional electricity production. Commercial wind production has been controversial wherever it has been proposed due to their immense size (300+ feet tall) and prominent locations on ridge lines. In Lamoille County, our ridgelines also serve as recreational areas including skiing and hiking which are incompatible with the operation of wind farms.

Even with exclusions for scenic and recreational areas (e.g. Worcester Range and spine of the Green Mountains), wind towers at a commercial scale may be possible in certain towns in the region. According to wind charts for the state produced by Vermont Department of Public Service, Belvidere (Cold Hollow Mountain), Eden (Eden Mountain), and Wolcott (Northeast hills) have Class 6 and 7 wind zones. Wind classes of 6 and 7 are generally sought for commercial wind farms. These areas are generally found at higher elevations (over 2,500 feet) and along north to south ridgelines.

While commercial operations may not be possible in many towns, there may be areas in towns where small private wind generation may be possible. This should be encouraged provided safety and aesthetic considerations are met.

Cogeneration (wood burning) is another potential to generate large amounts of electricity. This has been used successfully for many years at a large scale in Burlington (McNeil Plant). These facilities are generally combined with large building complexes as the steam can be used to heat buildings after generating power. These types of facilities have been discussed in conjunction with Johnson State and other large facilities in the county. These generating facilities can be successful if combined with a forest conservation plan to ensure a sustainable supply of wood to burn.

Other sources of electricity, such as methane recovery and solar, have not been extensively used in Lamoille County. Test cases for electricity generation from manure (methane capture) have been conducted in Addison County and these types of facilities could be explored for some of Lamoille County's largest farms if the interest and investment dollars were available. Solar power is only realistic at a household level in our northern climate.

The heating of homes and businesses is an important sector in energy plans especially in northern Vermont. One locally renewable source for heat in Lamoille County is wood. Solar power has also been used efficiently to heat water which is another component of home heating. Other sources of home heating fuel include oil, gas, kerosene, and electricity.

Current sources of energy for heating. In Lamoille County, according to the 2000 Census, 60% of homes heated with oil or kerosene, 23% heated with gas or liquid propane (LP), and 13% with wood. Electric heat is highly discouraged due to it being inefficient and placing a high demand on local utilities to

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REGIONAL TRANSPORTATION PLAN FOR THE NORTHEAST KINGDOM

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REGIONAL PLAN FOR THE NORTHEAST KINGDOM 2005 CONTRIBUTORS:

NVDA Executive Board	Steve Patterson
Mary Paull	Doug Morton
Merike Petrich	Annalei Babson
Alison Meaders	David Snedeker
Tracy McIntyre	Jeff Owen
David Gruenig	Judy Butson
Brian Hanson	Laurie Zilbauer
Cindy Turner	John Hall
Shannon Bedor	

POLICY STATEMENT

This region recognizes its responsibility to provide for production, storage, and distribution to meet its local energy demand. Individuals, businesses, and organizations are encouraged to develop distributed generation that meets accepted environmental standards in order to satisfy their power demand and allow for net metering to the extent allowed in Vermont statute.

New industrial/commercial energy development shall meet the highest standards required by law. Permitting authorities shall first consider current and historical land use and the culture of the region as well as the land owner's rights. Any development shall to the extent possible be done so as to mitigate adverse impacts to the region.

Any project deemed acceptable shall carry with it a plan that distributes benefits to the towns in the region proportional to the adverse effects experienced by that town. Long term maintenance, safety issues and decommissioning procedures required at the end of the energy project's life must also be included in the project plan.

REGIONAL ENERGY GOALS

- Provide an adequate, reliable, and secure energy supply to meet the region's needs.
- Support affordable energy to the region's users.
- Encourage a diversified energy portfolio.
- Maximize the net-metering capacity in the region.
- Promote energy generation that provides the best cost-benefit to the region.
- Minimize environmental impacts of energy generation and usage.
- Encourage conservation and efficiency as an integral part of the energy portfolio.
- Minimize energy safety risks.
- Limit the negative aesthetic impacts of power generation and distribution facilities.
- Provide for broad public participation in the decision-making process.
- Support documented local needs and values for new energy development.
- Ensure energy needs will be met in the event of a natural or man-made disaster.

STRATEGIES

- Support the re-establishment of energy contracts with Hydro Quebec and Yankee Nuclear.
- Investigate the potential for short-term contracts with generation from the Connecticut River Dams to minimize transmission losses due to other sources.
- Promote the upgrade of regional transmission systems to reduce gateway constraints.
- Encourage municipalities to reduce their energy costs through conservation and efficiency programs.
- Encourage ISO-New England to address the grid's dependence on natural gas.
- Support rail infrastructure as a cost-effective transportation resource for the energy industry.
- Sustain and upgrade the infrastructure of existing hydro-generation facilities.
- Promote wood-based energy generation as a complementary resource to the wood-related industries in the region.

- Assist in the development of businesses that support alternative energy use.
- Promote energy efficient building design and construction methods.
- Support the stabilization of energy costs through the use of supplemental sources (wood) and the development of small renewables, such as wind and solar.
- Encourage energy audits and weatherization programs.
- Encourage the development of energy facilities that assist local agriculture and forestry (i.e. grass/wood-pellets, small-wind, solar, farm-methane, wood-chip, biodiesel).
- Assist businesses to develop energy efficient production methods.
- Encourage the PSB to examine the long-term sustainability of proposed facilities.
- Ensure developments subject to Act 250 consider new energy requirements.
- Assist businesses/municipalities to develop cogeneration and other alternative energy strategies.
- Promote the coordination of Vermont Emergency Management and local responders to adequately provide energy resources during the event of a long-term disaster.

NORTHEAST KINGDOM PORTFOLIO

The portfolio recommendations section of the 2011 Energy Strategy should also be considered as guiding language for regional energy policy. (See Vol. II Chapter Two – 2011 Energy Strategy)

CHAPTER THREE

Utilities & Facilities

EDUCATIONAL FACILITY GOALS

- Schools should be closely integrated with the local communities they serve, including the business community.
- Educational facilities should have the capacity to benefit both students and local residents.
- Affordable educational and training opportunities should exist for all persons within the region.

STRATEGIES

- Promote cooperation between institutions of higher learning and local businesses to create quality training and employment opportunities for local residents.
 - Encourage public involvement in school board decisions.
 - Increase involvement of school officials in the local planning processes. Investigate how towns and educational institutions can coordinate projects that would benefit the greatest number of persons.
 - Investigate opportunities for shared facilities between municipalities and institutions.
 - Support local and regional efforts for workforce development and adult education.
 - Support the efforts of local and regional libraries to provide quality facilities and materials for independent learning and education.
 - Promote combined public/private educational programs and shared resources. Eliminate boundaries that impede knowledge and resource sharing.
-

WASTEWATER, SEWAGE & STORMWATER MANAGEMENT GOALS

- The region's towns should have adequate wastewater treatment facilities with sufficient capacity to meet current needs and projected future development.
- Public investments in utility facilities and services should be in agreement with local plans and be directed toward town centers, villages, or other designated and planned growth areas.

STRATEGIES

- Support proposals to upgrade and improve existing wastewater treatment facilities.
 - Encourage the proper disposal of hazardous materials, particularly household hazardous materials that are difficult to treat in secondary systems.
 - Provide advice and technical assistance to communities and groups interested in developing community wastewater systems.
 - Assist communities to interpret and abide by changes to state and federal laws regarding municipal and on-site wastewater systems and stormwater regulations.
-

SOLID WASTE MANAGEMENT GOALS

- Municipal and regional solid waste disposal systems should be cost-effective, environmentally sound, and promote reduction, reuse, and recycling.
- Hazardous wastes should be disposed of at secure, environmentally sound disposal sites.

STRATEGIES

- Promote recycling, re-use, and waste reduction efforts throughout the region.
 - Support public education to promote proper waste disposal efforts.
 - Assist municipalities to adopt illegal dumping and burning ordinances.
 - Encourage communities to meet the waste management and recycling goals established by the Northeast Kingdom Waste Management District and municipal waste management plans.
 - Encourage communities to create or expand local recycling facilities.
 - Encourage communities to eliminate or clean up illegal dump sites and brownfields in the region.
-

CHAPTER FOUR Historic, Cultural & Scenic Resources

HISTORIC, CULTURAL & SCENIC RESOURCE GOALS

- Future development should follow traditional development patterns, while providing for economic development opportunities and livable communities.
- Significant historic, cultural, and scenic resources within the region should be identified and preserved.

STRATEGIES

- Promote local and regional tourism, since it is an important part of our economic base.
- Assist communities to preserve and maintain historic downtowns, village centers, buildings, and rural and scenic landscapes.
- Rehabilitate and re-use significant cultural, architectural, and historic sites, and community facilities, whenever feasible.
- Promote local traditions, skills, crafts, and the performing arts within the region.
- Utilize federal, state, and local programs for developing or preserving local cultural and historic assets.
- Disseminate information about historic tax credits to businesses and property owners.
- Assist communities to designate downtowns and village centers under the Vermont Downtown Program.
- Support local cultural resource initiatives to revitalize communities and downtowns.

CHAPTER FIVE

Housing

HOUSING GOALS

- An adequate supply of affordable housing should be available to the region's residents.
- The safety and quality of the existing housing stock in the region should improve.
- Partnerships with regional housing and human service providers should be strengthened, allowing for more effective service provision.

STRATEGIES

- Work with regional housing and human service providers, including Gilman Housing, NEK Enterprise Collaborative, and NEK Community Action to identify housing needs.
- Assist towns to create housing policies that address the affordable housing needs of low-income residents.
- Assist communities interested in adopting local building codes.
- Provide incentives for developers to create more rental and ownership housing that is affordable to middle income people.

CHAPTER SIX

Economic Development

ECONOMIC DEVELOPMENT GOALS

- The region's unemployment rate should be reduced.
- The training/skills of the workforce should be improved.
- Higher-wage jobs should be created.
- Coordinate economic development functions in the Northeast Kingdom.
- Towns should receive assistance in their economic development efforts.

designated in the local zoning bylaw, or occurs in an appropriate scale for its rural surroundings.

5. Industrial Parks

Some land uses, such as certain manufacturing processes, warehouses, or trucking-related businesses may be more appropriately located outside of any of the above areas because they 1) would be incompatible with nearby residential areas, 2) require immediate access to a major railroad or highway, or 3) need substantial amounts of land. Clustering these land uses in industrial parks can have the multiple benefits of efficient use of land and efficient provision of required infrastructure. Industrial/business parks are encouraged to be densely developed while allowing enough space for business expansion. Infrastructure connections that serve industrial parks should not contribute to scattered development outside of the industrial parks.

Developments of Substantial Regional Impact

For the purposes of this plan, Developments of Substantial Regional Impact are defined by the Northeastern Vermont Development Association as:

1. Projects that would have substantial and ongoing impact on two or more municipalities, including the host municipality.
2. Projects that would likely have substantial impact on a resource within the region that is widely used by people outside of the municipality in which it is located.
3. Projects that may affect development patterns to the extent that the character or identity of neighboring municipalities is significantly affected.

Adjacent Regions

The Northeast Kingdom does not exist or function separate from those regions that surround it. Therefore, it is critically important that this plan take into account the planning for these neighboring areas to insure a smooth transition between the regions. This will also reduce the adverse impacts that development in one region might have on the adjoining region.

The Northeast Kingdom is surrounded by five different planning regions in two states and one Canadian Province. Four of these regions are located to the south and west of the Northeast Kingdom in Vermont and include the Northwest Regional Planning Commission, the Lamoille County Planning Commission, the Central Vermont Regional Planning Commission and the Two-Rivers-Ottawquechee Regional Commission. New Hampshire's North Country Council abuts the Northeast Kingdom to the east and, finally, the Canadian Province of Quebec is to the north.

The Vermont planning regions abutting the Kingdom have a rural nature about them and they are very similar to the Northeast Kingdom. The regional plans that have been prepared for these regions are very similar to this plan for the Kingdom in wanting to maintain the rural nature of their areas.

IV. FUTURE LAND USE & DEVELOPMENT GOALS

- Traditional development patterns should be maintained and new development should be encouraged to follow these patterns.
- New development should be compatible with existing land uses, and agree with local plans.
- Historic structures, community facilities, and other buildings should be preserved and adapted for re-use.
- Brownfield sites should be reclaimed.
- Significant development proposals should consider the impact on adjacent regions.

STRATEGIES

TOWN CENTERS

- Encourage desired town center development through investment, maintenance, and expansion of appropriate infrastructure (sidewalks, water and sewer, parking, public spaces, etc.).
- Support beautification efforts in town centers and downtowns.
- Encourage adaptive reuse of historic structures through tax incentives, tax credits, grants, and loans, assistance in location of funding, etc.
- Assist communities applying for designation under the Vermont Downtown or Village Center Programs.
- Encourage mixed-use development (residential, commercial and appropriate light-industrial) in town centers.
- Direct public investment for new elderly and affordable housing towards town centers. Aside from promoting traditional settlement patterns, this will put seniors and low-moderate income residents closer to such amenities as transportation, shopping, and community activities.
- Encourage towns to plan for community recreational and social needs.
- Make reasonable accommodations for housing in town centers.

STRATEGIES

RURAL AREAS

- Support local conservation efforts.
- Encourage community open space plans and recreation infrastructure.

V. RECREATION LANDS

Recreation opportunities enhance the quality of life for residents and tourists alike, and contribute significantly to the regional economy. Outdoor recreation activities, such as hunting, fishing, hiking, snowmobiling, horseback riding, cross country skiing, and mountain biking require relatively little maintenance of the open spaces where they take place. These activities often coexist easily with other land uses such as forestry and farming, and take place on public and private lands. Private land owners have been generous in allowing recreational use of their land. Educating users about respectful and safe use is important in maintaining access to private lands in the future. Residential development and the subdivision of land over time have reduced the amount of private lands available for recreation. This increases the pressure on public lands and those private lands that are still accessible. According to the Vermont Department of Forests, Parks and Recreation, the posting of private land in the state more than doubled between 1988 and 1997 from about 100,000 acres to about 250,000 acres.

will be required to renew their utility license in 2012. Nuclear energy is produced using an atomic reaction. The process needed for this type of generation produces a lot of radioactive waste and environment temperature increases. Because of these two outputs, there is a lot of apprehension towards this type of energy production. Facility safety is another major concern for nuclear plants.

The large plants built in the 1960's and 70's generate very large amounts of electricity, but also have a greater range in the event of a disaster. Over the decades, nuclear power has evolved towards smaller more efficient reactors which in turn serve a smaller area. The proto-types for these systems have been around for decades: in both submarine development and for research facilities in remote areas of the globe. New designs allow a plant to be built underground or underwater, reducing the risk in the event of a disaster. The smaller design also allows the facility to be built and decommissioned in a much shorter time frame. Small reactors still retain a life-span similar to the large reactors, but are surprisingly more efficient. There are several U.S. companies and European companies developing these small-scale reactors today. They plan to be ready for mass production by 2010.

Renewable Resources

As fossil fuels and other traditional resources cause stress on our economy and environment, through rising prices and costly infrastructure, we should look towards newly emerging technologies and renewable energy sources to meet our needs. In June 2005, Vermont enacted the Renewable Portfolio Goal. The Renewable Portfolio Goal calls for utilities to meet growth in electricity demand (between 2005 and 2012) by using energy efficiency and new renewable-energy resources. This law encourages each retail electricity provider to supply an amount of new renewable energy equal to its total incremental energy growth between January 1, 2005 and January 1, 2012. However, the amount of renewable energy that each utility is encouraged to supply is capped at 10% of its total 2005 retail electric sales. If this goal is not achieved by 2012, then the policy will become a mandatory Renewable Portfolio Standard in 2013.

According to the *2005 Vermont Electric Plan*, Vermont's electric capacity is already 13% renewable. Renewable resources generally include solar, wind, methane, hydro, and biomass generation. However, due to the large quantity of hydro-power already utilized by the state, the Renewable Portfolio Goal restricted hydro-power from being considered part of a utility's Renewable Portfolio Goal. Only newly developed renewable resources are allowed to meet this need.

SOLAR

While Vermont may not receive enough solar radiation to provide for the complete electrical or heating needs of individual buildings, solar energy can be harnessed effectively as a supplementary resource. As a small scale renewable, solar energy can provide hot water, space heating, lighting, and electricity.

Solar space heating can be maximized through Green Building Design. This includes orienting buildings close to true south, as well as using appropriate windows on the south wall, installing thermal mass (brick, concrete, or water) to store the sun's energy, and using appropriate levels of insulation. Through these designs, as much as 60% of a building's space heat can be derived from the sun. This type of heating is termed "passive solar" because no moving parts are needed, the collection and storage system is built into the structure. Active solar systems require collector

In agricultural practices, the procedure also destroys harmful pathogens, reduces water quality impacts, reduces manure odors, and provides a new source of income to local farmers. The Blue Spruce Farm in Bridport, Vermont was the first farm in the state to develop a manure-methane generation system. The farm began producing in January of 2005 and estimates production at 1.7 million kWh annually. The project is supported through the Central Vermont Public Service's (CVPS) Cow Power Program, which grants financial assistance for the development of methane generation systems. Through this program, farmers receive 95 percent of the market price for the electricity produced plus the additional fees (4 cents/kWh) from participating rate payers.

With landfills, facilities are capped and have special extraction systems to remove the methane for generation. If not utilized, methane - which is 20 times more potent as a green house gas than carbon dioxide - escapes into the atmosphere. In late 2005, the Coventry Landfill began producing electricity from the facility. According to the Washington Electric Cooperative, this facility currently provides one-third of the Co-op's power demand, which is rated at approximately 3.5 MW. After future expansions, the Co-op expects the Coventry facility will be able to provide one-half of their current demand.

WIND

Today wind energy is on the forefront of the renewable energy movement. The U.S. Department of Energy has announced a goal of obtaining 5% of U.S. electricity from wind by 2020, a goal consistent with the current rate of growth of wind energy nationwide. According to the Battelle Pacific Northwest Laboratory, Vermont is currently ranked 34th out of the lower 48 states for wind energy potential.

At this time, our region harnesses wind energy only through small-scale individual systems; however, there are two commercial-scale wind energy projects proposed in the region. The Sheffield-Sutton Project, currently under review by the Public Service Board, proposes a 52 MW facility with 26 turbines on four different mountain tops. On East Mountain, four 1.5 MW towers are proposed as the first-phase of a demonstration project. The East Haven Project is also under review by the Public Service Board at this time. Several meteorological towers are already stationed on other ridgelines throughout the region to study the possibility of commercial-scale systems in Lowell, Ferdinand, and Brighton.

The siting of wind turbines has raised concerns about aesthetic impacts, erosion, noise, effects on wildlife, property values, public health, and economic impacts. Because of our region's mountainous terrain, the ideal location for commercial-scale wind turbines is on North-South oriented ridgelines with elevations between 2000 and 3500 feet above sea level. Each tower can range in height from 135 feet to over 400 feet tall, requiring specified FAA lighting for towers over 200 feet. Smaller individual owner-consumption towers are usually below 135 feet high and can generate on lower terrain. Larger ridgeline generation facilities may contain as few as 5 to as many as 40 turbines and are subjected to review and approval by the Public Service Board (30 VSA Section 248). As with the development of any energy generation facility, a Certificate of Public Good must first be issued by the Public Service Board. Prior to issuance, the Board takes into account the environmental, economic, and social impacts of a proposed facility. Municipalities are allowed to participate in the Section 248 review process. However, towns may only regulate the development of individual owner-consumption towers that are not connected to the utility grid.

manure-methane generation facility (2002 Census of Agriculture). Farms with over 200 cows can produce a favorable amount of generation, potentially over 1,000 MWH/year. The development of such systems can be costly however. If state and federal grants, tax credits, and incentives remain in place to combat the high start-up costs, manure-methane generation can be added to the region's energy mix.

WIND

Wind energy needs to be considered as a resource to meet some of our current and future needs. There are significant, legitimate issues surrounding commercial-scale wind generation. Many of these issues will be considered by the Public Service Board in its Section 248 review; however, other significant issues may not be considered under the present Section 248 criteria. Specifically, NVDA requests the Public Service Board, in its review, also consider the following criteria:

- 1) The consistency of the proposal with not only the region's plan and the host town's plan and zoning bylaws, but also the plans and bylaws of other towns which may be impacted by the proposed project;
- 2) A weighing of the potential benefits as well as negative impacts on not only the host town but other impacted towns, including a possible outline of tax payment benefits to impacted towns.
- 3) Applicants must include a comprehensive de-commissioning plan when filing for a Certificate of Public Good.
- 4) Appearance and operation of facilities should be weighed as an aspect to change the essential character of the area.
- 5) Proposed turbines should be sited to minimize the visual impacts.

Differing towns may take positions on wind energy facilities which may be at significant variance with each other. Town plans will be deemed compatible with this regional plan and with other town plans so long as the plans demonstrate that wind energy was taken into consideration in the development of the town's energy component.

BIOMASS

Biomass has the most potential to reduce the region's fossil fuel consumption than any other renewable resource. Majority of our fossil fuel consumption is for transportation and home heating uses, only a small portion of fossil fuels are used in electricity generation for the region. Wood chips, wood pellets, biodiesel, and grass pellets hold the greatest potential for Vermont to transition these uses towards renewable energy. The expansion of these resources will also offer the greatest support for our traditional economy (forestry and agricultural) and stabilize regional fuel costs. In the next few years, biomass usage should be promoted and expanded as a significant resource to diversify the region's energy portfolio and meet future energy needs.

NET-METERING

The regional plan supports renewable and local generation of different types, those that are currently available and those that are evolving so as to lower our dependency on fossil fuels and meet environmental goals. While net-metering will not provide a significant portion of our energy demands, it remains an important element in lowering regional consumption levels.

ENERGY EFFICIENCY & CONSERVATION

The Northeast Kingdom can expect energy efficiency improvements to meet a significant portion of the growth in energy demand. Efficiency programs, such as the ones offered by Efficiency Vermont, and conservation efforts should be promoted and utilized as much as possible.

REGIONAL GOALS & STRATEGIES

Policy Statement

This region recognizes its responsibility to provide for production, storage, and distribution to meet its local energy demand. Individuals, businesses, and organizations are encouraged to develop distributed generation that meets accepted environmental standards in order to satisfy their power demand and allow for net metering to the extent allowed in Vermont statute.

New industrial/commercial energy development shall meet the highest standards required by law. Permitting authorities shall first consider current and historical land use and the culture of the region as well as the land owner's rights. Any development shall to the extent possible be done so as to mitigate adverse impacts to the region.

Any project deemed acceptable shall carry with it a plan that distributes benefits to the towns in the region proportional to the adverse effects experienced by that town. Long term maintenance, safety issues and decommissioning procedures required at the end of the energy project's life must also be included in the project plan.

Regional Energy Goals

- Provide an adequate, reliable, and secure energy supply to meet the region's needs.
- Support affordable energy to the region's users.
- Encourage a diversified energy portfolio.
- Maximize the net-metering capacity in the region.
- Promote energy generation that provides the best cost-benefit to the region.
- Minimize environmental impacts of energy generation and usage.
- Encourage conservation and efficiency as an integral part of the energy portfolio.
- Minimize energy safety risks.
- Limit the negative aesthetic impacts of power generation and distribution facilities.
- Provide for broad public participation in the decision-making process.
- Support documented local needs and values for new energy development.
- Ensure energy needs will be met in the event of a natural or man-made disaster.

Strategies

- Support the re-establishment of energy contracts with Hydro Quebec and Yankee Nuclear.
- Investigate the potential for short-term contracts with generation from the Connecticut River Dams to minimize transmission losses due to other sources.
- Promote the upgrade of regional transmission systems to reduce gateway constraints.
- Encourage municipalities to reduce their energy costs through conservation and efficiency programs.
- Encourage ISO-New England to address the grid's dependence on natural gas.
- Support rail infrastructure as a cost-effective transportation resource for the energy industry.

HISTORIC, CULTURAL & SCENIC RESOURCE GOALS

- Future development should follow traditional development patterns, while providing for economic development opportunities and livable communities.
- Significant historic, cultural, and scenic resources within the region should be identified and preserved.

STRATEGIES

- Promote local and regional tourism, since it an important part of our economic base.
 - Assist communities to preserve and maintain historic downtowns, village centers, buildings, and rural and scenic landscapes.
 - Rehabilitate and re-use significant cultural, architectural, and historic sites, and community facilities, whenever feasible.
 - Promote local traditions, skills, crafts, and the performing arts within the region.
 - Utilize federal, state, and local programs for developing or preserving local cultural and historic assets.
 - Disseminate information about historic tax credits to businesses and property owners.
 - Assist communities to designate downtowns and village centers under the Vermont Downtown Program.
 - Support local cultural resource initiatives to revitalize communities and downtowns.
-

TROY TOWN PLAN



Historic Postcard of Big Falls
Troy, Vermont

ADOPTED MARCH 20, 2008

new rural and tourism-oriented businesses within a limited area along these Routes, more specifically the intersections of Route 101 and 105 and Route 101 and 242.

Throughout the rest of town, there is a mixture of large agricultural corridors, large-to-small lot residential streets, recreation land, wetland areas, open space, forested areas, and a few commercial and industrial enterprises. For the future the town would like to maintain the sense of rural open space. To accomplish this, residential development and other uses can continue to be allowed but encouraged to have the least impact on the surrounding landscape. To maintain natural, scenic, and environmentally sensitive areas the development permitting process should address these elements. Some of these sensitive areas identified by residents include the Missisquoi River and its floodways, traditional farming areas, prominent local hills, scenic view sheds, significant forest areas, and important wildlife habitats. As the town grows, these sensitive areas should not end up in isolated pockets due to residential sprawl, but rather maintained in corridors that complement the local landscape, encourage connectivity to the village and hamlet, and provide significant recreation opportunities.

Overall the future vision of Troy includes bustling village centers surrounded by a scenic rural landscape with all of the elements identified in this plan cooperatively working together to accommodate growth and ensure a rich quality of life.

Zoning

The existing zoning in the Town of Troy is guided by four district areas, which include a Rural District, Village District, Commercial-Residential District, and Industrial District. Although these zones have worked well over the past several years, Troy has re-evaluated the current zoning bylaws in light of future development and current land use trends. From this re-evaluation Troy recommends the following updates for the zoning bylaws to both reflect the values of the community and guide future community development.

Village District - The objective of this district is to maintain the village areas of Troy as the centers for commercial and social activities. All areas within the Village of North Troy and Hamlet of Troy are zoned Village District except where otherwise noted.

Recommendation

The Village District should continue to include the Village of North Troy and the Troy Hamlet. The boundary for the Village of North Troy should match the existing incorporated boundary of the Village, but the boundary for the Hamlet should be expanded to accommodate this area as a growth center for the Town. Both the Village and the Hamlet areas should encourage small lot sizes, density, and appropriate street design that support mixed-uses and alternative transportation modes. Parking regulations should be developed as well.

Commercial Residential - The objective of this district is to provide areas for residential and commercial development.

Recommendation

Due to the increasing traffic along Route 101 and Route 105 outside of the village areas, the Town would like to allow commercial enterprises within two new “hub” areas. These areas will concentrate around the intersections of Route 101 and 105 and Route 101 and 242. This district aims to encourage both rural-scale and tourism-oriented businesses that

support the development of manure-methane generation facilities. Farms, such as the Chaput Family Farm, have the required number of cows to support a manure digester (200+). Digesters heat manure to optimum levels for methane production, then extract the methane to be burned for electricity generation on site. The resulting outputs from the process includes a dry product, which can be used as animal bedding, and a liquid fertilizer that has less water quality impacts and a significantly reduced odor. At this time, USDA Rural Development grants and loans exist to help farmers with the start up costs.

Farmers may also benefit from producing crops that are used for biofuels. Crops such as soybeans, rapeseed (canola), and sunflowers are now popular for the development of biodiesel. Biodiesel will have the most potential as a renewable fuel in Vermont, both through its incorporation into heating oil and transportation uses. Corn is a popular crop for the development of ethanol based fuels, another biofuel. However, ethanol-based fuels are less reliable for Vermont's colder climate. Local farmers may also gain from growing switchgrass, which is a relatively new resource that is used to produce pellets for heating. While grass-pellet heating is still in early-development stages, it has the potential to provide very economical heating.

According to the National Renewable Energy Laboratory, Vermont's daily solar levels are not considered high enough to generate sustainable solar power. Although, there are currently residential properties successfully employing solar technology for electric and hot water needs in Troy. With the increasing trend of rising heating oil and electric costs, solar power has a strong potential as a supplemental fuel source and should be considered viable as a renewable energy source in town.

According to the Vermont Environmental Research Associates' Wind Resource Maps, there are no suitable areas for commercial-scale wind development in Troy, but the neighboring towns of Lowell, Westfield, and Jay contain sites with classifications of six and seven (with 7 being the greatest potential). Land owners should look towards small-scale owner consumption towers as a feasible source of wind energy in town.

Energy Goals

- Maintain an adequate, reliable, and secure energy supply in town.
- Encourage the efficient and conservative use of our energy resources.
- Minimize local energy expenses.

Strategies

1. Support the development of renewable generation systems and small-scale net-metered systems in town.
2. Replace the expensive electrical heating system in the Town Offices with a more economical and efficient heating system.
3. Support the reuse of the existing hydro-generation facilities.
4. Encourage new buildings to have a high 'R' values and utilize low-flow fixtures.
5. Maintain gravel roads and utilize local gravel resources.
6. Conduct Energy Audits on all municipal buildings.

Town of Wolcott Town Plan 2008

Prepared by the Wolcott Planning Commission

Adopted by the Wolcott Selectboard on February 6, 2008

**Regionally approved by
the Lamoille County Planning Commission on May 27, 2008**

**This latest version of the Wolcott Town Plan was developed using funds
awarded by the Agency of Commerce and Community Development
through the Municipal Planning Grant Program**

Table 4-7. Wolcott Employment and Wage Figures by Industry, 2006

Industry	# Businesses	# Employees	Average Wage (\$)
Goods Producing	16	83	27,022
...Mining	1	Suppressed	Suppressed
...Agriculture	1	Suppressed	Suppressed
...Construction	12	50	23,230
...Manufacturing	3	Suppressed	Suppressed
Serving Providing	13	55	25,554
...Retail Trade	4	27	24,853
Federal Gov't (Postal Service)	1	6	33,497
Local School	1	31	24,108
Local Government	1	10	16,155
Total	35⁵	186	25,745

Source: 2007. Vermont Dept. of Labor, Quarterly Covered Employment & Wages report

Measures of Total Income

In contrast with the State's average wage data, the U.S. Census Bureau measures total income (e.g. wages, dividends, public assistance, etc.) in its surveys. However the Census 2000 income data will continue to be the most recent for Wolcott until 2010 data is released. Generally Wolcott incomes have been lower than, but increasing with, county and state numbers, as shown by Table 4-8.

Table 4-8. Per Capita and Median Family Income (\$), Wolcott, Lamoille County and Vermont, 1969-1999

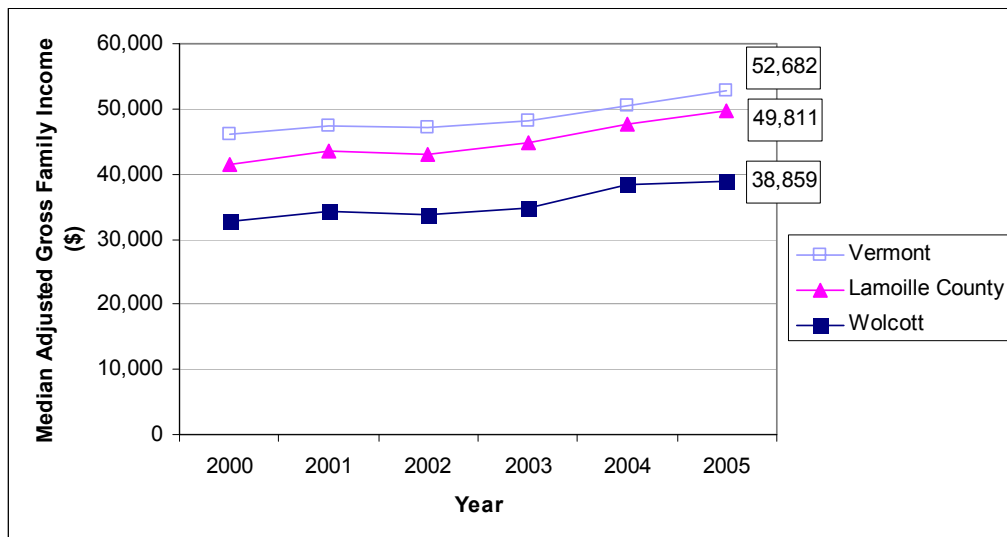
	Per Capita Income				Median Family Income		
	1969	1979	1989	1999	1979	1989	1999
Wolcott	3,062	4,010	9,931	15,198	12,679	31,023	38,056
Lamoille County	2,820	5,572	12,519	20,972	15,766	31,772	44,620
Vermont	4,682	6,178	13,527	20,625	17,205	34,780	48,625

Source: U.S. Census Bureau, 1970, 1980, 1990 & 2000 Censuses of Population and Housing

The median adjusted gross family income data from the Vermont Tax Department is also intended as a measure of total income and comes out much more frequently than Census data. However, it should be noted that tax data is subject to a multitude of intricacies, including periodical tax statute revisions, which may hinder their ability to represent local income situations. Like the Census income data, Figure 4-5 shows that Wolcott's median adjusted gross family income has trailed county and state numbers while following the same trends.

⁵ Data suppression may produce a discrepancy between the number of businesses per industry and the total number of businesses.

Figure 4-5. Median Adjusted Gross Family Income (\$), Wolcott, Lamoille County and Vermont, 2000-2005



Source: 2006. Vermont Department of Taxes

Measures of Livability

The Livable Wage

Aside from an analysis of trends, the Wolcott wage and income data presented above means little without something to compare to. Vermont statutes require the State's Legislative Joint Fiscal Office to release an annual study of baseline data of the cost of living in the state and the current wage levels within various sectors of the economy. The results of the study are estimates of a "livable wage" for various urban and rural family situations. A livable wage is the salary required in order to meet a family's needs, including food, housing, clothing, taxes, meager savings, and personal portion of health insurance⁶. The larger the family, the more income is required to fulfill those needs. Table 4-9 below depicts the 2007 livable wage figures.

Table 4-9. Livable Wages for Rural Families in Vermont, 2007

Family Unit	Livable Wage (\$)	
	Annual	Hourly
Single person, no children	30,307	14.57
Single parent, 1 child	44,168	21.23
Single parent, 2 children	49,820	23.95
2 parents, 2 children – 1 wage earner	51,562	24.79
2 Parents, 2 children – 2 wage earners	71,735 total	17.24 each

Source: 2007 *Basic Needs Budgets and the Livable Wage* (revised March 2007), Vermont Legislative Joint Fiscal Office, Montpelier, VT.

⁶ The livable wage data assumes that the employer is paying a portion of health insurance.

There are six cemeteries in the town of Wolcott, all of which are cared for and overseen by the Wolcott Cemetery Commission - an elected 5 member Board. Their sizes and capacities are listed in Table 5-2.

Table 5-2. Sizes and capacities of Wolcott's Cemeteries

Cemetery name	Size	Capacity status
Davenport Cemetery	0.6 acres	Reportedly sold out
Fairmount Cemetery	20 acres	Some space left in the annex.
Hubbell Cemetery (private)	0.25 acres	Number of lots remaining unknown
Pierce Cemetery (private)	0.5 acres	Lots no longer available for sale
Taylor Cemetery	7 acres	Up to 1000 single grave lots
West Hill Cemetery	0.5 acres	Lots no longer available for sale

Source: 1990. *Wolcott Utilities & Facilities Report* by P. Spear for LCPC with update from Wolcott Town Clerk

Scenic Resources

Scenic resources, while valued by residents and visitors alike, are difficult to regulate. Wolcott values its many beautiful vistas, forested hills, and open fields but it would be unfair to deny the right to develop based on how ones property looks from a roadway. In order to balance the rights of property owners with requirements for attractive and safe development, the town adopted site plan approval for all non-residential development proposals. Overall Wolcott's Zoning and Subdivision Regulations make multiple references to scenic values.

The purpose of site plan approval is to ensure quality development rather than to prevent development. Poorly designed projects or ones that are inflexible to Development Review Board recommendations may be denied approval, but the intent is for the standards to be flexible. In developing guidelines, the Planning Commission should strive for standards that will ensure quality, attractive developments. Where possible, proposals should protect open space, retain natural vegetation, screen parking lots from view, be of a pleasant appearance, and other similar requirements.

Subdivision regulations should also reflect these principles. Lot lines should protect open space and scenic ridgelines, as should conserved areas of any planned unit developments. Telecommunication towers are another area of special concern with respect to scenic resources. Towers cannot be barred from town but they can, and should, be regulated to ensure they are sited and constructed appropriately.

While there are abundant scenic areas in town, three natural scenic areas stand out for special consideration – Baldwin Brook Falls, Wapanacki Lake and Wolcott Pond.

Baldwin Brook Falls is located just west of where the brook passes under the North Wolcott Road. The falls are located below a 12-foot dam. Immediately below the dam there is a sheer falls of 50 feet. The aesthetic appeal of these falls was impacted by debris pushed into the gorge during construction of the dirt road. Below the falls is an abrupt gorge about 20 feet wide by 30 feet deep, below which can be found two lower falls of 10 to 15 feet each. This waterfall and gorge is considered to be of statewide significance and deserves special consideration as a scenic resource.

Wapanacki Lake and **Wolcott Pond** are considered scenic as a result of their relatively unspoiled shorelines. In an age of large-scale camp development on nearly every lake and pond in the state, the scenic beauty of our shorelines stands out as a resource worthy of protection. While the state and others have protected much of the shorelines of these

SECTION 7.

PUBLIC AND PRIVATE UTILITIES, FACILITIES & SERVICES

Goals, Policies, & Recommendations of this Section

GOALS

Overall

- To ensure adequate public facilities and services are available to protect and enhance the lives of the residents and visitors of Wolcott.

Public Buildings

- For public buildings and facilities to provide adequate space, function, and location for the needs of public safety and municipal service provision.

Septic and Sewage

- For Wolcott to have the septic/sewer capacity necessary for desired community and economic development.

Electricity & Energy

- To promote energy efficiency, availability, and affordability through conservation, cost effective investment, and sustainable management of locally available renewable energy resources.

Education

- Provide educational services and facilities to meet the needs of Wolcott's children.

Public Safety

- For Wolcott to have well-trained and funded fire, police and rescue services to provide a safe environment in which to work, live, and play.

Recreation facilities

- To maintain and enhance recreational facilities and opportunities.

POLICIES

Electricity & Energy

- Energy efficiency will be included as a factor in municipal construction, purchases and use.
- The Town of Wolcott should use its party status in permitting processes to promote and facilitate the development of renewable energy sources in town when in balance with the other considerations in this plan concerning natural resources, aesthetic character and municipal services.

Telecommunications

- The Town must support and maintain initiatives to bring the availability of high-speed broadband Internet access to town.

Education

- Future residential development in town should be balanced with the capacity of the school district to provide educational services.
- The Town and School District of Wolcott should oppose all local, state and federal education policy mandates that are issued without supporting funding.

Public safety

- Developments in rural areas, with multiple structures and limited access (e.g. slope and length of drives), should install dry hydrant service or another water source.
- Driveways and private roads should not have excessive slope so as to accommodate fire and rescue vehicles.

Recreation Facilities

- Developers of large residential projects should include adequate open space for recreation by the future residents of the project.

Municipal Plan
of the
Town of
Belvidere, Vermont
2005-2010

Adopted – May 5, 2005
Confirmed by LCPC – July 12, 2005
Expiration Date – May 5, 2010

Prepared by: Belvidere Planning Commission

With assistance by: Lamoille County Planning Commission

Portions of this plan were developed using funds awarded by:
The Agency of Commerce and Community Development
through the Municipal Planning Grant Program.

- A natural vegetative buffer 25 feet wide is required for all streams and 50 feet for the North Branch.
- All wetlands are required to have a 50-foot buffer. No filling or draining of wetlands is permitted. Belvidere Bog should have a 100-foot vegetative buffer.
- No structures should be constructed within a flood hazard area. Filling of the flood hazard area or obstructing the flow of floodwaters is also prohibited.
- Agriculture, recreation fields, parks, and open space are all appropriate uses of flood hazard area.
- No form of land waste disposal or storage of possible contaminants should be permitted in high water table and ground water recharge areas.
- All construction where soil is to be disturbed should provide adequate erosion control so that no soil moves off site or into surface waters or wetlands.
- Agriculture and forestry must abide by AAPs and AMPs. Where an activity may have a negative impact on water quality, BMPs are recommended.

Natural & Fragile Area

- Development within or proximate to Kelly River Falls and Belvidere Bog will take place in such a way as to preserve their value for education, science, research, aesthetics, and recreation.
- Deer wintering areas must be protected from development and other uses that threaten the ability of the habitat to support the species. Commercial, residential, and industrial development shall not occur in these areas. Development will be permitted adjacent to deer wintering areas only if it is demonstrated, in consultation with the Department of Fish and Wildlife, that the integrity of the area for deer habitat will be preserved.
- Rare, threatened and endangered plants and animals and their habitats will be protected and preserved through appropriate conservation techniques. Where appropriate a buffer strip should be designed and maintained to ensure protection.

The recommendations are for the select board to consider purchase of a gravel pit to meet long-term needs of the town. The planning commission has a variety of actions including assistance to landowners and consideration of reclassification of the North Branch and reclassification of Belvidere Bog. The town should consider forming a conservation commission to oversee the purchase of publicly owned lands and development rights in town.

Recommendations

Land Resources.

- The town should consider purchasing the rights to a gravel pit or to purchase a property with sufficient gravel resources to provide for the town's needs in the future.
- Municipal gravel pits in Belvidere should develop plans to address environmental impacts as well as future restoration of the sites.
- Farm and forestland owners are encouraged to participate in the UVA program.
- The Planning Commission should assist landowners interested in Accepted and Best Management Practices with information and resources.
- The town should support the efforts of organizations in the purchase of development rights and other conservation methods provided the land protected meets the objectives of this

VI. UTILITIES & ENERGY PLAN

Energy Sources.

Electricity.

Electricity can be generated from a variety of sources including hydro, nuclear, and fossil fuels (coal, oil, natural gas). Other potential sources of electricity include solar, wind, biomass (wood burning), and methane recovery (from landfills or farms).

There is no commercial electricity generating facility in Belvidere therefore all power is purchased from other places. Belvidere's electricity providers purchase power from a variety of sources including hydro (Hydro-Quebec), nuclear (Vermont Yankee), and biomass (McNeil wood burning). Little of the electricity used in Belvidere originates from fossil fuels.

Wind towers may have promise as a local source of electricity. According to some studies of wind currents in the state, the Cold Hollow range, Belvidere Mountain and Laraway Mountain have sufficient wind potential for commercial generation. These areas, however, are far from the power grid, and portions have been identified for protection from development due to wildlife and aesthetic concerns (particularly Laraway Mountain). There are other areas in town where private wind generation would be possible and this should be encouraged provided safety and aesthetic considerations are met. It is important for Belvidere to establish where and to what extent wind power is to be permitted in town.

Although the North Branch of the Lamoille River runs through town, it is unlikely that any hydroelectric facility could be located in town. The high quality of the water and river habitat as well as the lack of steady flow makes it a poor candidate for such a proposal. Damming the North Branch in Waterville has been studied and has been determined to be unsuitable as well for the same reasons.

Heating.

The heating of homes and businesses is an important sector in energy plans especially in northern Vermont. One locally renewable source for heat in Belvidere is wood. Air pollution from wood is not a major concern for the Town at this time. Presently no restrictions are placed on the use of wood as a fuel for home heating. Solar power has also been used effectively in Lamoille County to heat water (which is another component of home heating). Other sources of home heating fuel include oil, gas, kerosene, and electricity.

In Belvidere, according to the 2000 Census, 54% of homes were heated with oil or kerosene, 29% with wood, and 15% with liquid propane (LP). Two homes (1.8%) were heated primarily with coal. Electric heat is highly discouraged due to it being inefficient and putting a high demand on the local utilities to provide power. This discouragement is part of the reason that only one house in Belvidere heats primarily with electricity.

Transportation.

The rural character of the town makes it necessary to have an automobile or other vehicle for transportation. Other than walking or biking, all power for transportation is from fossil fuels

GOALS, POLICIES, AND RECOMMENDATIONS:

The use of clean, renewable energy is a topic discussed prominently in global conferences. For many years, Belvidere has relied on renewable energy for electricity, renewable and non-renewable energy for home heating, and almost exclusively non-renewable energy for transportation. While residents do not have options to change some of these sources of energy, everyone can save money and energy by using more efficient appliances and vehicles or conserving power by turning off unused equipment.

The predicted continual slow growth of the town as well as technological and communication advances will create an ever-increasing demand for dependable electrical energy. Affordable electric rates coupled with available multi-phased power and adequate capacity will be critical to planning for future housing and economic development in Belvidere.

Energy Goals

- For citizens to generate energy locally from renewable sources, whether for heating, electricity, or transportation.
- Energy should be provided in a safe, reliable and efficient manner.
- To promote energy efficiency and conservation in the design, construction, and use of municipal, industrial, commercial, and residential structures.

These three goals address Belvidere's future energy sources, providers, and consumers. The policies and recommendations below offer some avenues to achieve these goals.

Policies

- Belvidere supports the use of wind and solar to generate electricity locally provided scenic and aesthetic concerns are addressed.
- Belvidere supports efforts to create a wood-burning or co-generation facility in Lamoille County.
- Wind towers shall not be located within the Cold Hollow/ Laraway district and the Natural Area district.
- All planning for power transmission lines should be strongly weighed in favor of underground placement in order to serve the other objectives of this Town Plan.
- The town should use energy efficient appliances in municipal facilities.
- Outdoor lighting, especially parking areas, should use cutoff fixtures to reduce light pollution and to allow lower wattage bulbs.

Recommendations

- The Planning Commission should consider requiring utilities be buried if subdivision regulations are drafted.
- The Planning Commission should exempt, or provide accommodations for, alternative energy adaptations (e.g. solar collectors) when developing bylaws.

CRAFTSBURY, VT



TOWN PLAN

Adoption Date: May 16, 2006

Introduction

Craftsbury is a complete community with many attributes that make it a special place to live. Residents have a strong sense of community and value their fellow residents along with the beauty of the Craftsbury landscape. Craftsbury has a traditional working community which fulfills most all the needs of its residents, including schools, recreation, business, hotels, forestry production, farming, general stores, post offices, funeral homes. In other words, one could be born and buried here with many needs being satisfied in between.

Craftsbury's visual beauty resides in its landscape and architecture. Craftsbury is strongly defined by the north-south chain of the Lowell Mountain range to the west. It has three lakes, Eligo, Little Hosmer and Big Homer along with many streams including the Black River, Hatch Brook, Weber Brook, Cass Brook, Wild Branch, and Whetstone Brook. The farming industry in town has created open land making wide vistas and rolling green fields another source of beauty.

The main street – North/South Craftsbury Road - has a village and one mile north, the common. The Common is a large grass field surrounded by a white fence, white clapboard houses and is host to many community activities. The town is often represented in photographs of the Common framed by the traditional white church with steeple at the north/west corner. There are an unusual number of 19th century homes, barns, institutional and commercial buildings, which give the town a visual continuity and harmony. Many homes are of the early Vermont farmhouse style with clapboards.

Craftsbury is complete with an educational system that offers grades from kindergarten to senior in high school. There is a private preschool as well as a small college in town adding to the educational opportunities to all.

There are two general stores, two gas stations, a choice of mechanics, and a variety of dining opportunities mostly associated with the local inns and bed and breakfasts. A large percentage of Craftsbury residents who work are employed in the Craftsbury area (almost fifty percent).

Craftsbury is also complete with an array of recreational opportunities including hunting, fishing, cross country skiing, biking, walking, canoeing, sculling and swimming. These activities occur predominantly on privately owned land as well as public lands on the town roads. The diverse landscape and the willing landowners are critical to the future of these multiple recreational activities throughout town.

From 2004 Community Survey:

As a place to live I find Craftsbury is:

Excellent	212 (56.2%)
Good	135 (35.8%)
Fair	27 (7.2%)
Poor	1 (0.3%)
Good-Excellent	2 (0.5%)

WHY? (Analysis of written responses):

<u>Social Aspects:</u>	<u># times cited</u>
Sense of "Community"	45
"People"	41
"Friendly"	12
<u>Rural Aspects:</u>	
Physical beauty of environment	45
"Tranquility," "Peace," or "Quiet"	27
"Rural" Qualities	19
"Small Town"	10

Table 6: Craftsbury Housing Units by Heat Source, Historical			
	1980	1990	2000
Heated with Utility Gas	0	0	0
Heated with Bottled / Tank / LP Gas	5	34	53
Heated with Electricity	12	5	3
Heated with Fuel Oil / Kerosene	138	154	226
Heated with Coal / Coke	4	0	3
Heated with Wood	116	151	138
Heated with Solar Energy	N/A	0	4
Heated with Other Type of Fuel	2	0	0

Source: U.S. Census Bureau - Census of Population & Housing, 2000 Summary File 3 Table H40

Conservation & Use of Renewable Resources

The conservation of energy is strongly encouraged by the planning commission. This plan recommends the use of energy saving products, such as insulation, efficient appliances, and, when necessary winter weatherization products. New construction and the replacement of old appliances, doors, and windows should always be done with energy efficient products. In addition, energy efficient behavior (shutting off lights when leaving the room, turning the thermostat down at night, etc.) should be taught and used at school, home, and in the workplace. The Planning Commission also recommends that energy audits be conducted in all public buildings, local businesses and farms.

The Planning Commission recognizes the importance of renewable energy resources and recommends their development and use within the town. These would include the use of wood heat, solar and small hydro. Wind resource maps created by Vermont Environmental Research Associates show no areas suitable for large wind towers in Craftsbury. Neighboring Eden does have one ridge a few miles from the Craftsbury border with classifications of 4 through 6. (Wind resources are classified from 1 through 7, with 7 being of the greatest potential. For comparison, the proposed site in Lowell is Class 6.)

Goal:

Encourage the conservation of energy and the use of renewable energy resources.

Objectives:

1. Provide education on energy efficiency and audits at the Town Clerk's Office.
2. Encourage burying electric and phone lines underground where appropriate.
3. Encourage orienting the placement of buildings so as to use passive solar or direct solar energy and heating.
4. Encourage the use methane digesters on farms for power generation.

Recommendation:

1. Urge, to the extent possible, new public structures to be built to conform to the Energy Goal and Objectives.

LOWELL **TOWN** **PLAN**

Adopted January 28, 2003

This Plan has been prepared and adopted in accordance with the provisions of 24 VSA, §§ 4381 through 4385 to provide for the future growth and development of the Town of Lowell in a manner that is fiscally and environmentally responsible.

LOWELL TOWN PLAN

Adopted 01/28/03

I. GOALS AND OBJECTIVES

The primary goal of this town plan is to provide for Lowell's residents: to further their opportunities to maintain an adequate and satisfying livelihood, to foster harmony among neighbors and to protect and maintain the rural lifestyle we all enjoy. It is to these ends the following objectives are set out.

- ❖ Allow for the development of light industrial uses.
- ❖ Allow for the development of more restaurants, recreational/ tourist facilities and other commercial uses that will provide services for residents and tourists alike.
- ❖ Maintain the Town's beautiful rural character as much as possible.
- ❖ Encourage development that will protect and strengthen the Town's tax base.
- ❖ Reduce or eliminate the pollution of surface waters from failed or failing septic systems and/or surface run-off.
- ❖ Have junkyards and other necessary but unsightly land uses screened.
- ❖ Provide for safe and convenient pedestrian access between the village and the town hall/library by building a sidewalk on the west side of Route 100.
- ❖ Provide for orderly growth to prevent or reduce negative impacts on the Town.
- ❖ Encourage clustered development, using the planned unit development process, in those areas that can support such development as a means of protecting the Town's environment.
- ❖ Protect Lowell's forests, wildlife, and other natural resources.
- ❖ Town officials should continue to maintain an awareness of the needs of both full and part time residents.
- ❖ Encourage open farmland for agricultural purposes.
- ❖ Allow for and encourage housing to meet the needs of low and moderate-income residents.
- ❖ Maintain that part of the Bayley-Hazen Military Road between Lowell and Albany, that is no longer maintained for vehicular use, for recreational uses.
- ❖ Encourage the development of more town owned and operated parks and other recreational uses and maintain the ones the Town already has.
- ❖ Encourage the maintenance of the roads in Lowell in such a manner as to allow for safe passage and to prevent traffic congestion.
- ❖ Allow development along Routes 58 and 100 that compliments and does not distract from the scenic qualities of these two highways.
- ❖ Encourage adequate off-street parking for non-residential land uses that is safe and easily accessible.
- ❖ Create a safer intersection at Routes 58 and 100.

During the Spring of 2000 the Lowell Planning Commission conducted a public opinion survey and held a public information meeting to determine the needs and desires of Lowell's residents with regard to the Town's future. The above goals reflect that survey and meeting. The results of this survey can be found at the end of this Plan.

LOWELL TOWN PLAN

Adopted 01/28/03

II. LAND USE PLAN

A. Existing Land Use

1. Forests

Lowell is a rural community where forestry is, without a doubt, the predominate land use. While this is especially true along the ridges that flank the west, south, and east sides of town it is also true throughout much of the rest of the Town. These forests are made up of a variety of species of trees.

2. Recreation

While the Town of Lowell does not have an organized recreation program, recreational opportunities abound for those who enjoy the outdoors. Lowell's forests offer opportunities for upland game, deer and moose hunting, snowmobiling, cross-country skiing, snowshoeing, and hiking while the Town's streams and pond provide some opportunities for fishing. Lowell's main and backroads also provide ample opportunities for both road and mountain bicycling. Neighboring towns also provide ample opportunities for the above mentioned activities and more. Both downhill and cross-country skiing are available at nearby ski areas and nearby lakes and ponds provide opportunities for boating, swimming, and fishing. Finally, for the young at heart there is the playground at the Lowell School.

For those who enjoy indoor activities, other opportunities are available in both Lowell and the nearby communities of Derby and Newport City. Within the Town of Lowell there is a business that offers both bowling and dancing. Indoor activities available in Derby and Newport City include different forms of entertainment and an indoor ice skating rink.

3. Agriculture

There are approximately **10** active **dairy** farms in Lowell. Most of the land used for agricultural purposes is located adjacent to Routes 58 and 100 with some located along some of the side roads. These **dairy** farms are very important to the community and the surrounding area, as good agricultural land is becoming increasingly scarce due to the demand for undeveloped land for new homes and other uses.

4. Residences

Along with agriculture and forestry, residential land use is also predominate in Lowell. Most if not all of these residences are single family dwellings. A good number of the residences in Lowell are located in the Village area, near the intersection of Routes 58 and 100, providing a cluster of homes

LOWELL TOWN PLAN

Adopted 01/28/03

for which municipal services can be easily and efficiently provided. However, just as many, if not more are scattered through out the Town along Routes 58, 100, and the side roads. This type of development does not provide for the efficient use of land or the efficient provision of municipal services.

5. Commerce and Industry

Today in Lowell commercial uses include recreational (ie. campground, bowling, dance hall), retail (ie. auction business, convenience store), restaurants (including a snack bar and a bar), small engine repair, automotive repair, building contractors and excavation and septic contractors. There are also many Home Occupation businesses in Lowell; computer and internet related, woodworking, arts and crafts and art studios, education, forest and wildlife management consulting, etc.

Lowell also has an abandoned asbestos mine which has been closed for some time. This mine is located on the Mines Road near the Lowell/Eden town line.

6. Public & Semi Public Uses

Semi-public uses in Lowell include three churches. Two are located on Route 58 in the Village (St. Ignattious Catholic Church and the Lowell Baptist Church) and one on Route 100 (the United Church of Christ). One of these churches is located in the Town's old town hall, which they purchased from the Town after the Town built its new town office building.

Public uses in Lowell are limited to 1) the elementary school, 2) the town office building (which includes the Lowell Public Library), and 3) the town garage. Both the elementary school and the town office building are located on the west side of Route 100 just a short distance north of the intersection of Routes 58 and 100. Detailed descriptions of the school and town office building can be found in the Education and Utility and Facility sections, respectively, of this plan.

7. Open Spaces Reserved for Conservation Purposes

The former Lowell Town Plan, adopted on December 12, 1989, contains wording to authorize a Conservation Mountain district to limit development in those areas of Town least suited for development. Such a district was established in the current Lowell Zoning Bylaw, adopted March 6, 1990, and the objective for this district designates those areas over 2,000 feet in elevation as being in the Conservation Mountain district. These areas are generally forested, are inaccessible and have moderately steep to very steep slopes. It should be noted that those areas in Lowell that are above 1,500 feet also possess many of the same characteristics as those areas above 2,000 feet in elevation. These areas can be found along the Town's eastern, southern, and western boundaries.

LOWELL TOWN PLAN

Adopted 01/28/03

8. Present Land Use Map

The existing land use/land cover map is on file in the Lowell Town Clerk's office and can be viewed there.

B. Proposed Land Use

1. Forests

Any land area in Lowell that has steep slopes and/or shallow soils should have a very low intensity of development. This land is generally suitable only for forest purposes. Some agricultural uses, and, at a very low-density, seasonal and year-round dwellings, which should be permitted only if the site can support a well and septic system and there is adequate public access to the site.

This plan recommends that all lands above 2,000 be designated as being in this district.

The minimum density for the Conservation Mountain district should be one family per ten (10) acres.

2. Recreation

As recreational opportunities abound in Lowell and the surrounding towns, the Planning Commission does not see the need at this time to recommend any kind of an organized recreation program. However, because Lowell's recreational opportunities are dependent on the quality of Lowell's environment, it is necessary to protect and maintain Lowell's wonderful natural resources from development. Any development away from the Village that will involve a structure should be carefully sited to reduce negative visual impacts and on lots large enough to provide adequate water supply and sewage disposal.

Fishing, hiking, and hunting on non-posted lands has always been accepted in Lowell. Since motorized vehicles can harm the land and cause great annoyance and inconvenience, permission (preferably written) should be secured before entering private land.

3. Agriculture

Farms are important for Lowell. Areas with good agricultural soils should be given preferential consideration when that when that can encourage the continued operation of farms in these areas.

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LOWELL TOWN PLAN

Adopted 01/28/03

4. Residences

Residential land use is by far the most predominant man made land use in Lowell. As such, dwellings should be permitted in most areas of town. However, the density of development should be dependent upon the availability of access and the ability of the soil to handle on site water and sewer systems without creating water quality problems.

5. Commerce and Industry

The Village of Lowell should continue to function similarly as it does today with some moderate growth in those areas that can support growth. The types of land use found in the Village are residential homes, usually of year round residents; public and semi-public buildings such as the school, town office and churches; and commercial operations that are needed to serve the people of Lowell. These include stores and some commercial-recreational type facilities. Generally, the new residential growth should be allowed to continue as long as it meets minimum requirements. Other types of growth in the Village should be allowed only as conditional uses. This would allow a decision to be made by the Board of Zoning Adjustment concerning the desirability of a particular use. Guidelines set forth for the review of conditional uses would allow the Board to place conditions on zoning permits that would reduce or eliminate any negative impacts a particular use might have on the area.

Light, non-polluting industries can significantly add to a town's tax and employment base, and, in most cases, could do so without placing an undue burden on the Town's services or natural resources. While there are no uses of this nature in Lowell at the present time, the Town may want to provide for this type of use to offset Lowell's present nature as a bedroom community. Limited industrial development may provide the revenue necessary to provide the services required by a growing population. That area to be set-aside for industrial uses should have good access to Route 100. The minimum lot size in this district should be sufficient to allow for industrial structures, parking, and on lot water and sewer systems.

Light, non-polluting businesses can add to the Town's employment and tax base. However, such development needs to be carried out without placing an undue burden on the Town's services or natural resources. Businesses that serve the community with goods and services should be given priority.

As Lowell is relatively far from major centers of employment and industry it is important to realize some residents will wish to build their own businesses here. This should not be discouraged. Allowing retail business and light industry in the Village and Rural Residential districts should not be a cause of disruption or disharmony if the equal rights of all the residents of Lowell can be kept in mind and respected. While this plan may not discourage medium and large businesses from moving to Lowell from other towns and/or states, it should be recognized that these businesses are not as valuable to Lowell as the home grown businesses are.

LOWELL TOWN PLAN

Adopted 01/28/03

6. Public & Semi Public Uses

Generally, sufficient land area exists for public purposes. Sites for existing public buildings are adequate. It would be desirable to obtain additional property to expand the Town Forest at some point in the future to assure a sizable public holding of undeveloped land within the community.

7. Open Spaces Reserved for Conservation Purposes

Any of the land in Lowell that is remote with steep slopes and shallow soils should have a very low density of development. In addition, this plan discourages the filling of wetlands for development. Therefore, major wetlands in the community should be recognized and protected from filling and development.

The Planning Commission is very concerned about agricultural runoff and the negative impacts it can have on water quality. Lowell's farmers should be encouraged to take whatever measures are necessary to prevent the pollution of ground and surface waters caused by agricultural runoff.

8. Proposed Land Use Map

The proposed land use map is on file in the Lowell Town Clerk's office and can be viewed there.

9. Uncontrolled Development

Development and growth that comes too quickly puts an undue strain on the schools and roads and may adversely effect water resources and sanitation. Growth in Lowell, therefore, must be slow enough and controlled enough not to lower the quality of life the town residents now enjoy.

LOWELL TOWN PLAN

Adopted 01/28/03

III. TRANSPORTATION PLAN

A. Present

1. Highways & Streets

Lowell, as a rural community, depends entirely on its highway system and private vehicles for transportation purposes. Thus, the highway system is of the utmost importance to the Town of Lowell. Table 1 shows the highway mileage in Lowell broken down by classification and who is responsible for maintenance.

Within the Town of Lowell there are two State highways. Route 100 is a north/south highway providing access to Newport City to the north and Morrisville, Stowe, and Interstate 89 to the South. Route 58 is the east/west highway and it provides access to Barton and Interstate 91 to the east and Montgomery and other points to the west. Route 58 to the west of Route 100, however, is a town road with a gravel surface. This portion of Route 58 passes through Hazen's Notch and is closed during the winter months.

Route 100, classified as a rural minor arterial, passes through the Missisquoi River valley and is generally in good repair, it has paved shoulders that are two feet wide, and has relatively few problems. The problems that do exist include an unsafe segment between mile markers 5.6 and 5.9 (see Summary Report of the VT 14/100 Corridor Study, page 49), poor pedestrian access to the Lowell Graded School, and a dangerous intersection with Route 58. To the north of the Village is a segment of Route 100 (between mile markers 5.6 and 5.9) with an "S" curve that makes it difficult for northbound drivers to see the farm and cattle crossing to the north (this farm is not currently in operation and therefore not a hazard at this time). The intersection of Routes 58 and 100 is hazardous due to the fact that Route 58 enters Route 100 on a hill. This hill prevents southbound drivers on Route 100 from seeing cars turning onto or crossing Route 100 and it prevents drivers on Route 58 from having a clear line of sight to the north along Route 100. The Town of Lowell strongly encourages the State of Vermont to correct the line of sight problem at the intersection of Routes 58 and 100 to make this a safer intersection.

Route 58 to the east of Route 100, which is classified as a major collector, passes over the ridge that forms the northern end of the Lowell Mountains and therefore provides many scenic vistas to the west and north. This highway needs to be repaved but it has not yet been included in the State's

1. MILEAGE SUMMARY		
Town Roads:		
Class 1	0.000	
Class 2		
No. 1	4.150	
No. 2	0.500	
No. 3	5.200	
Class 3	22.950	
Total		32.800
State Highways:		
Route 58	5.096	
Route 100	7.031	
Total		12.127
Total mileage		44.927
Mileage as of 02/10/93. Excludes class 4 mileage		

LOWELL TOWN PLAN

Adopted 01/28/03

repaving program. That portion of Route 58 west of Route 100 is an unpaved Class 2 town road that is eligible for State and/or Federal funds for maintenance

2. Parking Facilities

While there is no public off-site parking in Lowell, some parking is provided on-site for many, if not all, properties. In many cases, however, parking is not adequate, especially in the village.

3. Transit Routes

The main transit routes in Lowell are Routes 58 and 100. These routes, described above in the Highways and Streets subsection, connect Lowell with the surrounding towns, other parts of the state, and areas outside of the state. These routes are of primary importance to the residents of Lowell for transportation to other parts of town as well as areas outside of Lowell.

4. Terminals

At the present time, the nearest bus stops are in Newport City and Orleans Village where one can catch a Vermont Transit bus for points south. Vermont Transit provides service along the Interstate 91 corridor and transfers can be made in White River Junction where service is available to other parts of the State. Service to areas outside the State of Vermont is also available from White River Junction.

5. Bicycle and Pedestrian Routes & Trails

At the present time there are no bicycle trails or routes in Lowell. However, there is a considerable amount of bicycle traffic on Routes 58 and 100. This, combined with the increase in traffic during the summer months, could cause traffic flow and safety problems for both cyclists and motorists.

Routes 58 and 100 within the Village also lack sidewalks, thus making pedestrian travel hazardous as well. This would be especially true along Route 100 between the Route 58/100 intersection and the Lowell Town Clerk's office. The Town of Lowell has a number of side roads, and some trails (including the Long Trail) for people who like to hike. The Long Trail passes over the ridge along Lowell's western boundary.

6. Scenic Roads

Route 58 is perhaps the most scenic road in Lowell. This highway passes over some of the higher elevations in Lowell and therefore offers some spectacular views. That section of Route 58 between Irasburg and Route 100 crosses an elevation of almost 1,700 feet above sea level. The spectacular views from this section of Route 58 are to the north and west and include the ridge of mountains that make up the western wall of the Missisquoi River (East Branch) Valley. At the height of land in

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Hazen's Notch, about 1,900 feet above sea level, the views, although limited, are primarily to the east and west and include the Missisquoi River valley on both sides of the ridge.

7. Airports

The State of Vermont owns a network of 10 airports around the State. Two of these airports are located within a 20-mile radius of the Town of Lowell. One is the Newport State Airport located in Coventry and the other is the Morrisville-Stowe State Airport.

The Newport State Airport, located in Coventry, was constructed in 1941 and has two paved runways that are 4,000 feet long. The runways are designed for aircraft weighing less than 12,500 pounds and with wingspans less than 79 feet. Visual and navigational aides are available which allow for non-precision approaches for aircraft equipped with electronic navigational instruments.

The Morrisville-Stowe State Airport, located in Morristown, was also constructed in the 1940's and has one paved runway that is 3,700 feet long. The design specifications for this runway are similar to the specifications for the runways at the Newport State Airport. Visual and navigational aides are available which allow for non-precision approaches for aircraft equipped with electronic navigational instruments.

Both of these airports provide a number of activities that are beneficial to the surrounding areas. Perhaps the most important are the search, rescue, and law enforcement services that are available. From an economic perspective, there are a number of business uses that are available as well. These services include shipping, education, and training, aerial inspections, photography, and advertising, and other business related activities. Finally, these airports also provide an opportunity for recreational pilots to enjoy their hobby.

For traditional commercial service one must travel to Burlington; Rutland; Lebanon, NH; Manchester, NH; Boston, MA; Portland, ME; or Montreal, Que.

8. Railroads

The nearest railroad terminals are located in Newport City and Orleans. Freight service is available from these two points; however, there is no passenger service available. The nearest passenger terminal is located in Montpelier.

10. Map of Present Transportation & Circulation Facilities

The existing transportation and circulation facilities map is on file in the Lowell Town Clerk's office and can be viewed there.

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5. Bicycle Routes & Trails

During the summer months there is a considerable amount of bicycle traffic on Routes 58 and 100. The combined bicycle and automobile traffic creates a situation that is hazardous for all concerned. The ideal solution to this problem would be the building of a bicycle trail that runs parallel with these routes. Such a trail would totally separate automobile and bicycle traffic. However, the Lowell Planning Commission realizes that the addition of bicycle lanes on both sides of Routes 58 and 100 would be a more practical solution. Therefore, the Planning Commission would like to encourage the State to consider the addition of bicycle lanes in any future improvements to these two routes. Equally important for bicycle traffic are turn outs located at scenic spots to give bicyclists, and motorists as well, the room they need to stop and enjoy the view without causing hazards by blocking vehicular traffic.

In addition to the recommended improvements for bicycle travel, the Planning Commission would also like to recommend the construction of a sidewalk along the western side of Route 100 from the Route 58/100 intersection to the Lowell Town Clerk's office. Such an improvement would greatly improve pedestrian safety along this segment of Route 100

6. Scenic Roads

Route 58 is one of the most scenic roads in Vermont and any development along this corridor should not detract from the enjoyment of views from this corridor. Therefore the Planning Commission would like to see this scenic corridors maintained for all to enjoy.

7. Airports

At the time this plan was being written, a number of improvements were being planned and/or considered to the Morrisville-Stowe and Newport State Airports. These improvements may have been completed by the time this plan is adopted. In the next two paragraphs these improvements will be presented.

At the Morrisville-Stowe State Airport the State is looking at four possible improvements. These include a runway extension, removal of a small hill near the runway, the installation of a lighting system to help guide pilots into the airport at night, and the improvement of airplane radio to telephone communications. These improvements will greatly improve the utility and safety of this airport.

At the Newport State Airport the State is looking at three possible improvements. These include the rebuilding and resurfacing of runway 18-36, improvements to the existing ramp area and the installation of an automatic weather observation system. Finally, for some time there have been those who feel that at least one of the runways at the Newport State Airport needs to be lengthened

LOWELL TOWN PLAN

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4. Libraries

Everything about the new library (funding, hours, number of volumes, etc) has been deemed adequate to meet the current demands at this time. However, while the Planning Commission is pleased with and recognizes the library's adequacy, it strongly encourages Lowell's Selectboard and voters to take whatever actions are necessary during the time that this plan is in effect to insure that the Lowell Library continues to meet the needs of the Town's residents.

5. Power Generating Plants

While the Town of Lowell has little or no influence over the operation of the privately owned hydroelectric generating plants in Lowell, the Planning Commission does encourage the continued operation and maintenance of these sites as they are seen as a benefit to the Town of Lowell.

6. Transmission Lines

The Lowell Planning Commission would like to encourage the Vermont Electric Cooperative to take the necessary steps to upgrade their substation to insure that the Town's electrical needs are adequately met in the future. For the protection of our environment, residents and wildlife, transmission line rights-of-ways should not be sprayed with herbicides.

7. Water Supply

At this time there is no need for nor is it feasible to build a municipal water supply system in Lowell. However, the development of public water and sewer systems may be required for greater development in the Village area. Development in this area should be carefully monitored so that the Town can determine the need for public water and sewer systems if and/or when such a need arises. Possible water sources for a public water system may exist in the hills just south of the Village.

In addition, the Town may want to consider making information available regarding the maintenance of a private water supply and on-site sewage disposal system. This would be a beneficial service to help residents find and maintain a quality water supply and establish and maintain an on-site sewage system that will not pollute any water supply system or the Town's surface waters.

8. Sewage Disposal

At this time there is no need for nor is it feasible to build a municipal sewage disposal system. However, the Lowell Planning Commission is concerned about on-site sewage disposal and therefore recommends that before a site is developed it be carefully examined and tested before a septic system is installed. The Planning Commission also recommends that any new septic systems be installed in compliance with the isolation distances set forth in the Vermont Health Regulations.

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Adopted 01/28/03

V. PRESERVATION PLAN

A. Rare & Irreplaceable Natural Areas

Within the Town of Lowell several natural areas need to be considered in this Plan. These areas include wetlands, surface waters, and forests.

There are at least 2 major wetlands in Lowell. The larger of these 2 wetlands is located to the west of the Mines Rd and north of Potter Brook Rd. The other wetland is located on the town line between Lowell and Irasburg near the southwest corner of Irasburg. Surface waters in Lowell include 4 small ponds & many miles of streams and rivers including the East Branch of the Missisquoi River, which begins in Lowell.

Approximately 90% of Lowell is covered with forests with some of this area being made up by the mountains on west side of town. Along the tops of these mountains is the Long Trail.

All of the features described above provide important benefits for the wildlife and people that reside in Lowell. These areas provide an important and sensitive habitat for the plant and wildlife these areas support. They also provide numerous recreational benefits for the residents of Lowell. These areas shall be protected from over development so as to maintain the current pristine status of these areas so that they will continue to provide the habitat necessary for the Town's plant and wildlife and the recreational benefits to the Town's residents.

B. Scenic Features

Route 58 from the top of Lowell Mountain to Hazen's Notch is one of the most varied and beautiful six miles in Vermont. Therefore, this plan encourages the establishment of this stretch of road as a scenic corridor. While it is not the Town's intention to prohibit or unduly restrict development on this road the Planning Commission feels it is in the best interests of everyone in Lowell, those who own property on this road and those who do not, to be very sensitive to its scenic quality and the pride and benefit it gives the Town. If there ever was a road in Lowell where everyone should wish for sound aesthetic judgement to be exercised in the siting and building of structures, it is here.

C. Historic Features

The Town of Lowell was founded in 1787 and at that time was called Kelleyvale. The Town's name was changed in 1831 to Lowell. Since Lowell was incorporated, several historic features have developed that are discussed below.

LOWELL TOWN PLAN

Adopted 01/28/03

VIII. ADJACENT TOWNS & THE REGION

The Town of Lowell is bordered by seven towns. These include Albany, Eden, Irasburg, Montgomery, Newport Center, Troy, and Westfield. At the time this section of the Lowell Town Plan was written only three of these seven towns had Town Plans in effect.

A. Albany

The Town of Albany does not have a town plan at this time. However, it is unlikely that the lack of a town plan in Albany will have any impact on Lowell. That area along both sides of the Lowell/Albany town line is remote and inaccessible. In addition, the ridge formed by the Lowell Mountains is only about a mile from this town boundary and forms a natural barrier to development. For the same reasons, it is unlikely that development in Lowell will have any impact on Albany.

B. Eden

Eden, like Albany, also does not have a town plan. However, once again the topography along the Lowell/Eden town line should be a deterrent to development in Eden that will impact the Town of Lowell. The only exception might be along Route 100, which joins Lowell and Eden.

C. Irasburg

Irasburg has many similarities with Albany and Eden. Irasburg does not have a town plan. Irasburg and Lowell are separated from Lowell by a ridge, and like Eden there is only one major highway, Route 58, connecting Irasburg and Lowell. Except for the land right along Route 58 most of the land along this town boundary is inaccessible. Therefore, any impact on Lowell by development in this area of Irasburg would most likely be along Route 58.

D. Montgomery

At the time this section of the Lowell Town Plan was written Montgomery had a town plan that was about to expire. However, the Montgomery Planning Commission was working on a new town plan. This new town plan, if and when adopted, along with the topography along the Lowell/Montgomery town line, should significantly reduce, or even eliminate any impacts that development in Montgomery will have on Lowell. Both the old and new Montgomery Town Plans call for development in this area that is compatible with the topography of this area and development in Lowell.

LOWELL TOWN PLAN

Adopted 01/28/03

IX. ENERGY PLAN

A. Energy resources

Energy for the heating, lighting, and hot water needs is available from a variety of sources. Heating oil and LP Gas is available from several distributors and dealers in Orleans County. Electricity is provided in Lowell by the Vermont Electric Coop in Johnson. Finally, fuels for the propulsion of motor vehicles are available in Lowell and some of the surrounding communities.

B. Needs

The needs of Lowell's residents for energy products are presently being met by dealers in the local area.

C. Scarcities

At this time the Planning Commission does not know of any scarcities of energy products.

D. Costs

At one time, electricity was a relatively inexpensive source of energy. This, however, is no longer true as electricity prices have been on the increase. In addition, Lowell's remoteness from the area's energy suppliers could have an impact on the price of energy in Lowell.

E. Problems

While there does not seem to be any problem with regard to the supply of energy, rising energy costs could be a very real problem for some of Lowell's families. Therefore, the Lowell Planning Commission would like to encourage energy suppliers to do as much as possible to either keep costs down or, to reduce the rate at which costs are increasing. In addition, if energy suppliers are not already doing so, the Planning Commission would also encourage these businesses to establish budget payment plans that spread energy costs out over the year.

The Town Clerk's office and the Lowell Graded School are new buildings and should already be well insulated and equipped with energy efficient systems. Therefore, these buildings should not present a problem for the Town of Lowell from the point of view of energy usage.

LOWELL TOWN PLAN

Adopted 01/28/03

F. Conservation of energy

The Planning Commission strongly advocates the conservation of energy. This plan recommends the use of energy saving products such as insulation, efficient appliances, and, when necessary, the use of winter weatherization products such as weather stripping, window plastic, and water heater wraps. New construction and the replacement of old appliances, doors, and/or windows should always be done with energy efficient products. In addition, energy efficient behavior (shutting lights off when leaving the room, turning the thermostat down at night, etc.) should be taught and used, at school, home and in the workplace.

The Planning Commission also recommends that an energy audit be conducted in the town garage. Then the necessary improvements should be made to this building to make it more energy efficient.

G. Development of renewable energy resources

The Planning Commission recommends the development of renewable energy resources. These would include the use of wood, solar, wind, and hydro energy.

H. Land Use & Energy Conservation

Several development techniques are likely to result in the conservation of energy. Building on south facing slopes will generally make a house less expensive to heat. Earth sheltered homes may also be less expensive to heat.

TOWN OF LOWELL, VERMONT

ZONING BYLAW

Adopted March 6, 1990
Revisions Adopted March 4, 2003

Tab 204.03: "C-M" Conservation-Mountain District

Objective: This is the district of the community that should have the least intensity of development as it is generally hilly, has poor access, and in many cases, has shallow soils.' With any intensity of development, much permanent damage will be done to the area. Generally speaking these lands are above 2,000 feet in elevation.

Permitted Uses:

- | | |
|-----------------------------|--------------------------|
| 1. Accessory use/structure | 4. Forestry ¹ |
| 2. Agriculture ¹ | 5. Home occupation |
| 3. Dwelling, one family | 6. Minor subdivisions |

Conditional Uses:

- | | |
|-----------------------|--------------------------|
| 1. Cemetery | 5. Recreational facility |
| 2. Essential service | 6. Travel trailer park |
| 3. Major subdivisions | 7. Windmills |
| 4. Public facility | |

Minimum Area and Dimensional Requirements:

Minimum lot area (acres) ³ :	10
Frontage (ft):	400
Front yard (ft) ² :	75
Side yards (ft):	50
Rear yard (ft):	100

Footnotes

¹ Exempted from the permit process by 24 VSA, § 4495.

² Front yard set back to be measured from the centerline of the traveled portion of the right-of-way.

³ 1 acre equals 43,560 square feet.

Montgomery, Vermont
Town Plan
2005



Comstock Bridge 1883
Restored 2003

ENERGY

GOAL: TO PROMOTE ENERGY CONSERVATION IN THE DELIVERY OF PUBLIC SERVICES AND THE USE OF PUBLIC FACILITIES AND INFRASTRUCTURE

Policies

- Encourage energy efficiency by making available information regarding groups and organizations in the State, which can provide consumers with information on how to become more energy efficient
- Promote car-pooling among area residents; encourage the use of informal park and ride lots where possible
- Make Town owned buildings as energy efficient as possible
- Encourage energy conservation by promoting patterns of development that utilize clustering and energy efficient site design whenever possible
- Encourage the development of renewable energy resources

TRANSPORTATION

GOAL: TO ENSURE REASONABLE, FUNCTIONAL, AND ORDERLY DEVELOPMENT OF TRANSPORTATION SYSTEMS

Policies

- Protect the health, safety, and welfare of the traveling public
- Promote safe, convenient, economic, and energy efficient transportation systems including public transit options and paths for pedestrians and bicycles
- Promote transportation activities that respect the natural environment
- Maintain the scenic character of the Town's rural byways
- Support public transit efforts of the Northwest Vermont Public Transit Network to increase mobility and access of Town residents

EDUCATION

GOAL: TO PROVIDE ADEQUATE EDUCATIONAL SERVICES RELATIVE TO ANTICIPATED POPULATION GROWTH. TO CREATE A LEARNING COMMUNITY THAT WILL PROVIDE OUR STUDENTS WITH THE TOOLS FOR LIFELONG SUCCESS

Policies

- Provide for the education of our school population without overcrowding, inefficient division of basic educational facilities, or reduction in the quality of our educational programs
- Ensure that rapid development will not inflict undue impacts and hardships upon the ability of the town to provide adequate educational services
- Broaden access to educational and vocational training opportunities

LAND USE

GOAL: To MAINTAIN MONTGOMERY'S RURAL CHARACTER AND SCENIC RESOURCES BY ENCOURAGING DEVELOPMENT TO FOLLOW WISE LAND USE PRACTICES

Policies

- Maintain the character of existing neighborhoods and avoid potential conflicts between incompatible land uses
- Limit development on slopes greater than 15% and maintain natural vegetation on slopes
- Protect scenic ridges by limiting development above 1,600 ft in elevation
- Steer development away from areas where soils will not support it due to shallow depth to bedrock, instability, or high water table
- Protect public health, welfare, and safety by limiting development in the flood plain
- Protect water quality by limiting development in Wellhead Protection Areas, wetlands, and along stream banks
- Conserve productive lands by accommodating development in areas apart from most farming activity
- Recognizing the community's susceptibility to flooding, new development shall conform strictly to floodplain regulations
- Promote new development in areas of existing infrastructure, such as roads, power, and water.
- Encourage sustainable agricultural and silvicultural practices to both protect the use of land and water resources, and keep a working rural landscape based on a practice of stewardship.
- Promote anti-sprawl initiatives as a measure to maintain the appropriate use of our land resources.

CHAPTER 8

COMMUNITY UTILITIES

GOAL: TO PROVIDE PUBLIC UTILITIES TO SUPPORT CONCENTRATED RESIDENTIAL, COMMERCIAL, AND INDUSTRIAL DEVELOPMENT AND PROTECT PUBLIC HEALTH AND WATER SUPPLIES IN AREAS WITHOUT MUNICIPAL SERVICES

Policies

- Use extension or new construction of water and sewer systems to remedy existing problems, promote orderly and timely land development, and carry out the purpose of the land use
- Ensure that individual on-site septic systems and water supplies are sited and installed in a manner that protects public health and the quantity and quality of ground water and surface water
- All telecommunications and electric facilities shall be located in appropriate areas; respecting the integrity of residential areas, aesthetic concerns, and natural resource issues
- Promote universal high speed (broadband) internet access for improving access to municipal information, and to support telecommuting from home. Broadband internet access should be available in every home at a reasonable cost.

Water Supply/Systems

Since the 2000 Town Plan, Montgomery has been working on, and continues efforts on, a multi-year, multi-phase municipal water project:

- a. Phase 1 and 2 extended the municipal water distribution system from Montgomery Center to Montgomery Village where customers were previously served by a privately owned and operated water system. (The system had been cited by the State for numerous monitoring violations and residents had complained of inadequate water supply and poor water quality. The Town purchased the abandoned Montgomery Village Water Works from its owner for the sum of one dollar in 1999.) This portion of the project was done in two phases; extending the main line between the two population centers, and then replacing the feeder services to approximately 63 Village customers. This latter portion of the project ended in 2003, although there are still warrantee issues being discussed with the installation contractor. This portion of the project was funded by a bond paid by local taxes and a grant from the U.S. Department of Agriculture (USDA).
- b. Phase 3: After several failed attempts, a new well was found on Town-owned property off the Fuller Bridge Road in 2004. It appears to meet all requirements for certification as Montgomery's new municipal source (the current municipal well is gradually losing capacity). The Town must now build the necessary infrastructure to connect this source to the Municipal system which includes building a small treatment facility, a new reservoir on Fuller Bridge Road, and a small pump station between the Village and Center nodes of the system. There may also be some necessary site(s) work to meet control space and watershed protection requirements. Funding for this portion of the project will likely be from the remaining balance of the USDA grant and monies reprogrammed from the Environmental Protection Agency waste water grant. Tentative completion date for this phase is fall 2006.

PLAN FOR THE NORTHWEST REGION

2007 - 2012



Photo by: Jean Snide

Serving the Municipalities of Franklin and Grand Isle Counties

Adopted by the Board of Regional Commissioners

August 29, 2007

Effective: October 3, 2007



3.11 To protect endangered and threatened species and their habitats.

POLICIES:

3.27 Degradation and fragmentation of habitat for wildlife and threatened or endangered species should be discouraged.

3.28 Restoration of populations of endangered or threatened native species is encouraged.

3.29 Planting for vegetative buffer strips and screens should include species beneficial to native wildlife.

3.30 As opportunity arises, the potential to reduce the impact of hydroelectric facilities on important aquatic species should be examined and appropriate modifications and/or selected removal is encouraged.

HISTORIC RESOURCES GOALS:

3.12 To preserve important historic structures in the region.

3.13 To locate and map areas with potential archeological resources.

POLICY:

3.31 Development should seek to minimize impact on archeological sites, through avoidance if possible, then through mitigation or other methods determined by the state Historic Preservation office.

OBJECTIVE:

3.5 Work with local, state and federal agencies and private groups to preserve historic structure and historic resources in the region.

SCENIC AND AESTHETIC RESOURCES GOALS:

3.14 To preserve significant scenic and aesthetic resources of the region for the benefit of current and future generations.

3.15 To encourage land uses that enhance the image of a working, sustainably managed, natural resource based economy balanced with settled towns and wildlands.

POLICIES:

3.32 Support the use of donations or purchase of scenic easements by public or private groups.

3.33 Support local efforts to designate important scenic areas or corridors.

3.34 Encourage efforts to improve sites that have an existing structure, use or development that diminishes the scenic view.

3.35 Encourage the scale, siting, design and management of new development to be in keeping with the character of the landscape and the area's built environment.

3.36 Discourage development along prominent ridgelines and hilltops.

3.37 Encourage developments to use vegetative and landscaping screens to reduce their visual impact.

3.38 Encourage the use of incentives for preservation of scenic views and scenic corridors.

3.39 Exterior lighting should employ technologies and designs that minimize light leaving the site, particularly by down shielding lights, arranging them so that they are not directly visible from nearby roads, residences or distant vantage points, and limiting the need for additional exterior lighting.

3.40 Creative methods of arranging lighting to reduce overall foot candles, improve true color rendering and provide for even lighting which minimizes overly bright areas, or "hot spots", are encouraged.

3.41 Discourage development that will significantly increase the degree of "light pollution", which is understood to mean lighting that illuminates the night sky.

ENERGY

INTRODUCTION

This chapter addresses the requirement that each regional plan contain an energy component, “which may include an analysis of energy resources, needs, scarcities, costs and problems within the region; a statement of policy on the conservation of energy resources; and a statement of policy on patterns and densities of land use and control devices likely to result in conservation of energy” (24 V.S.A. § 4347).

With a number of exceptions, most energy production decisions affecting the Northwest Region are controlled by forces outside of the region. Energy demand, on the other hand, is well within the purview of the region’s residents. Northwest residents can influence the amount of energy demanded with methods that range from personal decisions to buy energy efficient products to public policy decisions, such as the development of land use policies that encourage tighter settlement patterns and subsequently reduce the amount of energy demanded by the transportation sector, among others.

ELECTRIC POWER PRODUCTION

According to the 2005 Vermont Electric Plan, the majority of electric power produced in Vermont is split between nuclear power from Vermont Yankee Nuclear Power Plant at 36 percent and hydroelectric power from Hydro Quebec at 35 percent. During the same year (2002), 14 percent of Vermont’s electric supply consisted of short-term purchases from the New England Power Pool (NEPOOL), 12 percent consisted of small hydroelectric operations within the State and other renewable sources, while the remaining three percent consisted of gas and oil.

Vermont Yankee Nuclear Power Station, located in Vernon, is Vermont’s largest supplier of locally produced electric power. The plant began generating commercial power in 1972 and is licensed for operation until 2012. It was purchased from Vermont owners by Entergy Nuclear Vermont Yankee, LLC in 2002. In 2003, Entergy petitioned the Public Service Board for a 20 percent power uprate, or increase in generation, which was approved in March 2006 by the Nuclear Regulatory Commission (NRC).

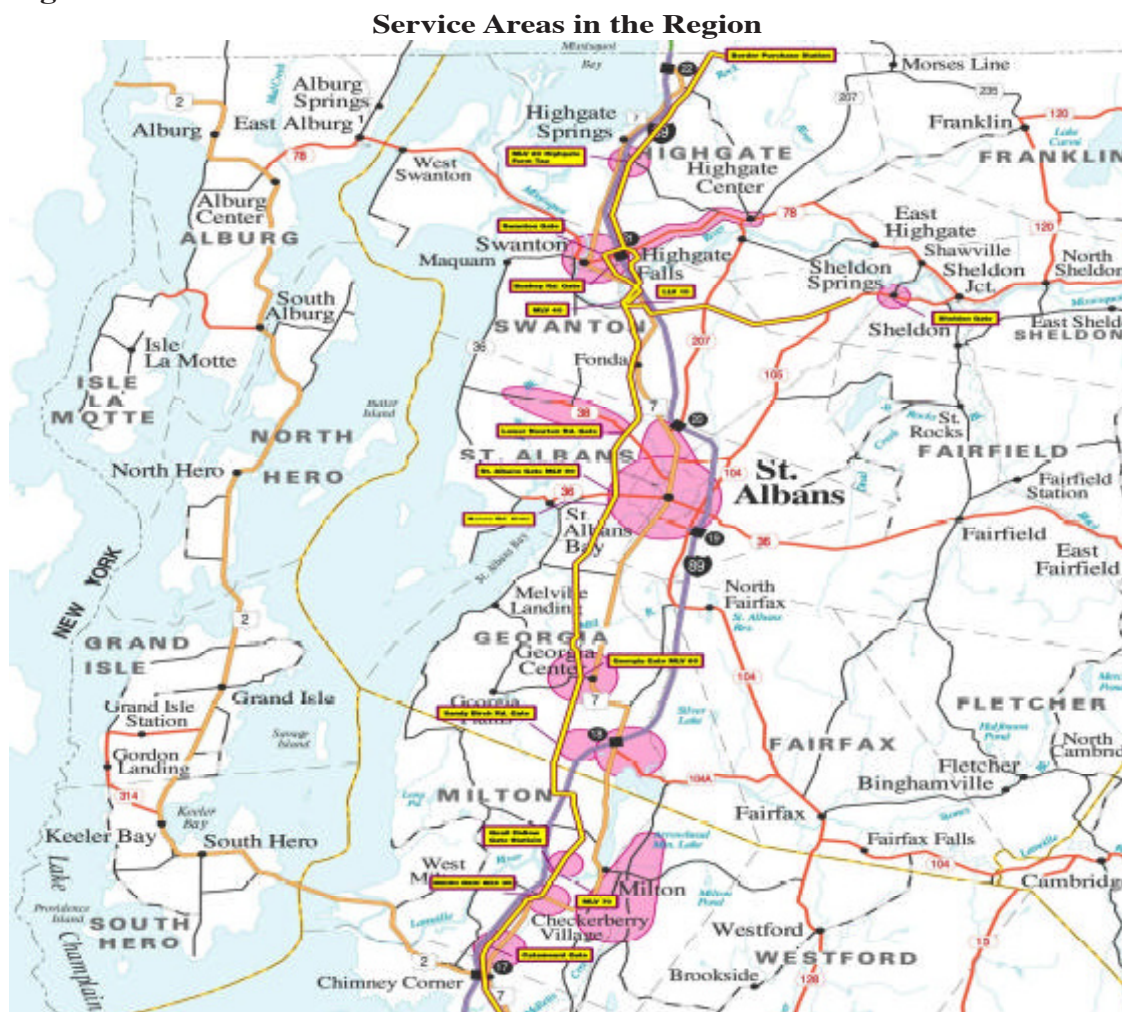
Entergy has applied for the renewal of their 20-year operating license from the Nuclear Regulatory Committee in January of 2006. A decision from the NRC is expected in the summer of 2008. Entergy will also have to seek approval from the Vermont Public Service Board.

Power imported from Hydro Quebec is the second largest supplier of electric power. In 1990, the PSB approved a 30-year contract between a group of eight Vermont utilities, known as the Vermont Joint Owners (VJO), to purchase additional long-term baseload power from Hydro Quebec and to make it available at wholesale to the rest of Vermont’s utilities. Most of the power imported from Hydro Quebec runs over major transmission wires (345 kV) to a converter station in the Town of Highgate (located west of Highgate Center and north of the Missisquoi River, see Figure 6.2) operated by the Vermont Electric Company (VELCO). The converter acts to synchronize power with the infrastructure used by CVPS and other Vermont electric utilities. The VELCO converter generates over 115,000 kV and serves the needs of one-fourth of Vermont’s population. Much of the remaining Hydro Quebec power is brought into Vermont through direct transmission links with Quebec maintained by Vermont Electric Cooperative (VEC). When and if these two major sources of electricity become unavailable, a large block of Vermont’s electric load will have to come from alternative sources.

There are four electric utilities providing service to Franklin and Grand Isle Counties (see their general service

There is one natural gas (utility gas) distribution company in Vermont, Vermont Gas Systems (owned by Northern New England Gas Company, who is owned by Gaz Metro of Montreal), serving Franklin and Chittenden Counties. VGS's transmission line connects to the TransCanada Pipeline in Highgate Springs. See figure 6.2 for a visual of service areas in the region.

Figure 6.2



Map created by Vermont Public Service Department

ALTERNATIVE ENERGY RESOURCES AND POTENTIAL

Wind power

Wind energy offers the prospect of creating an increasing share of electrical production with greatly reduced effects on air pollution compared to conventional generation methods. New technologies are now available to harness wind to produce power that is highly efficient and a viable alternative to other more traditional sources of power. Despite the fact that wind energy is clean and a relatively secure fuel source, the siting of wind turbines has raised questions about aesthetic impacts, noise, and effects on wildlife. It is the intent of this section, to provide developers, regulators, and landowners with an understanding of the sensitive nature of the placement of wind energy facilities and the statutory review process they undergo.

Wind power generation facilities can commonly include equipment, site conditions, or locations which raise concerns within a community, or the state as a whole. Research has shown for larger generation facilities, locations between

Contemporary solar technologies, in many cases, have proven their value in Vermont, particularly in rural areas. As the technologies improve and costs decrease, solar thermal collectors and photovoltaics (technologies which can convert sunlight to electricity) are likely to become more competitive in the marketplace, especially in less remote areas. As the power source of solar technologies is inexhaustible, and solar energy neither contributes pollutants to the atmosphere nor adds to our reliance on foreign energy suppliers, public policy should encourage further research and use of this energy source.

Methane Generation

There is great potential in Vermont for anaerobic digestion and methane recovery as an energy source from a variety of sources including manure, industrial waste, and solid waste. Specifically, the number of methane digesters on farms is growing in Franklin County as dairy farmers are recognizing not only the energy potential, but environmental and economic benefits as well. In 2001, a Resource Assessment was completed as part of the Vermont Department of Public Service (DPS) and the Vermont Department of Agriculture, Food, and Markets (AGR) project to explore the technical feasibility and potential of this energy resource. The study found that 5.1 million wet tons per year of organic residues and waste are generated in Vermont. Of this amount, over 3.4 million wet tons per year, or about 2/3 of that generated is potentially available for farm-based anaerobic digestion, the vast majority being dairy manure. The study asserts that “although the amount of organic residues and wastes potentially available appears large, the electrical energy potential is just under 30,000 kW (or 30 MW), which is surprisingly small.” The Study then projects that the overall average energy potential per dairy farm is calculated to be just under 18 kW. The DPS and AGR are continuing to study anaerobic digestion and methane recovery as an energy source, specifically looking at economic feasibility and the overall benefit to individual Vermont farms. A pilot study is in place involving model digesters on many dairy farms throughout the state to further improve the technology.

Biomass

According to the Vermont Department of Public Service, Vermont is a national leader in the research, development, and commercialization of wood energy, in particular the clean combustion of wood chips for heat and electricity production. Virtually all of Vermont’s wood chip usage comes from mill wastes or sustainably harvested chips from low quality trees. There are four types of biomass energy applications that Vermont DPS has been working on. They include biomass district energy, heating schools with wood chips, industrial and commercial applications, and the Vermont Gasification Project (VGP), located at the McNeil Plant in Burlington.

POWER GENERATION - PLANNING STRATEGIES AND POLICIES

In planning for and in reviewing proposals for power generation facilities, the following strategies and policies should be considered:

1. In evaluating the aesthetic impacts, planners should first define the character of the proposed site, and second determine the degree to which the proposed facility will fit with the existing landscape. There are recognized methodologies available to objectively evaluate scenic quality. Factors that should be used in evaluating scenic quality should include:
 - Vegetative and topographic diversity;
 - Order of landscapes and patterns of development (i.e. village and countryside);
 - Focal points;
 - Visibility/Viewer Sensitivity;
 - View Duration; and Prominence/Dominance.

Proposed projects should meet the aesthetic test set forth under Criterion 8 of Act 250. This criterion states that the project shall “not have an unduly adverse affect on scenic resources or the natural beauty of an area, aesthetics, historic sites or rare and irreplaceable natural areas”. The process known as the Quechee Analysis

Local zoning bylaws may also permit the creation of planned unit developments (PUD). These are a grouping of mixed use or residential structures, preplanned and developed on a single parcel of land. The setback, frontage, and density requirements of the zoning district may be varied, in consultation with the town planning commission, to allow creative and energy efficient design (i.e. east-west orientation of roads to encourage southern exposure of structures, solar access protection, use of land forms or vegetation for windbreaks, and attached structures).

Subdivision regulations govern the creation of new building lots, as well as the provision of access and other services and facilities to those lots. Subdivision regulations, like the PUD, involve the town planning commission or development review board in the design process. As with the PUD, the planning commission should use the opportunity to ensure that the conservation of energy is considered in subdivision development.

Except through the Act 250 process, there is no regulation of energy use in new construction in the Northwest Region. Act 250 requires that “best available technology” for energy efficiency and recovery be used in construction. In its review of development proposals, Act 250 applies to life cycle cost test to determine the “appropriate level” of energy efficiency. The “appropriate level” requires the developer to invest in energy efficiency up to the economic break-even point for a particular structure, occupant, and usage pattern. This standard allows for flexibility in design without sacrificing the energy efficiency of specific measures.

GOALS, POLICIES & OBJECTIVES

GENERAL GOALS:

- 6.1 Encourage conservation and efficient use of energy thereby saving the Region’s financial resources and the world’s energy resources.
- 6.2 Seek to incorporate the full costs of energy use in decision making.

POLICIES:

- 6.1 In the evaluation of all energy projects, those with the least adverse environmental, aesthetic, economic, and social impacts are preferred.
- 6.2 A broad range of options that could meet energy needs should be considered when evaluating energy-related projects, including conservation, efficiency and education, and those with the least adverse environmental, aesthetic, economic, and social impacts evaluated in the short and long term should be supported.
- 6.3 Efforts that reduce the energy demanded for transportation should be supported.
- 6.4 Efforts that reduce the emission of pollutants from energy production and/or consumption, particularly greenhouse gases and contributors to ozone depletion, should be strongly supported.
- 6.5 Promote least cost planning, or life cycle costing, which considers all costs of energy production and use, including environmental and social costs, from the origination of inputs to the disposal of outputs.
- 6.6 Generation, transmission and distribution lines or corridors should avoid adverse impacts on significant wetlands, plant and animal habitat, and recognized historic, natural, or cultural resources.
- 6.7 Support building standards that promote energy-efficiency.

OBJECTIVES:

- 6.1 NRPC should work with municipalities to develop an energy element for the municipal plan, which, if implemented, will result in energy savings to the community.
- 6.2 NRPC should assist in review of proposals for new energy sources or facilities to evaluate the economic, social, scenic and environmental costs.

- 6.3 NRPC will continue to review and/or participate as a statutory party in Public Service Board Section 248 applications for a Certificate of Public Good.

POLICIES:

- 6.8 Promote longterm ecological management and sustainable use of renewable energy resources in the Region.
- 6.9 Encourage locally produced renewable energy sources which create local jobs, stimulate investment in the Region, and have minimal environmental impact.
- 6.10 Encourage research and production of on-farm production of biomass for energy, with reasonable caution given to the introduction of invasive species and production of unmanageable wastes.
- 6.11 Support and encourage the development of energy systems that utilize locally produced biomass and gaseous by-products, such as the methane released by area landfills, industry wastes, and manure pits, for local and regional energy consumption.
- 6.12 Reduce the consumption of non-renewable energy resources.
- 6.13 Promote the redesign or retrofitting of existing hydroelectric power systems to improve efficiency and reduce environmental damage.
- 6.14 Promote hydroelectric power systems that do not disrupt riverine ecology.
- 6.15 Support and encourage communities to enable appropriately sited and scaled wind energy systems.

OBJECTIVE:

- 6.4 In the review of utility, industrial and commercial projects, NRPC should promote the incorporation of co-generation as an energy source wherever possible.

LAND USE GOALS:

- 6.3 Encourage energy efficient and energy conserving patterns of land use.
- 6.4 Increase use of energy conservation practices in site planning and development at the local and regional level.

POLICIES:

- 6.16 Growth should be clustered in areas served by existing infrastructure, with priority given to growth that occurs in designated growth centers.
- 6.17 Commercial strip development along transportation corridors should be discouraged in favor of clustered development.
- 6.18 Infill development that builds on land between existing nearby buildings should be encouraged.
- 6.19 Concentrate housing, employment and social services to reduce the demand for transportation.
- 6.20 Building should occur on south-facing slopes and be oriented toward the south to reduce heating costs.
- 6.21 Landscaping and topography should be used to minimize building heating and cooling needs.
- 6.22 Plans for generation, transmission and distribution lines should incorporate the following design principles:
1. Rights of way shall not divide land uses, particularly agricultural lands and large contiguous forest parcels.
 2. Geographic features should be used to minimize the visual impacts of corridors. Corridors, lines and towers should not be placed on prominent geographic features such as ridge lines and hilltops.
 3. Placement and maintenance of utility lines should minimize the removal of vegetation and the disruption of views from public highways, trails and waters.
- 6.23 Encourage the private sector to develop energy conservation and renewable energy technologies.

- 6.24 Support financial incentive packages for or the act of retrofitting existing or developing new housing stock with more energy efficient materials.
- 6.25 Encourage and assist municipalities to adopt land use ordinances that facilitate energy conservation and reduced energy consumption.

OBJECTIVES:

- 6.5 NRPC will review projects to promote energy efficient land use planning and construction.
- 6.6 NRPC will review Act 250 applications to ensure energy efficiency site planning.
- 6.7 NRPC will encourage municipalities to adopt standards for review which include energy efficient standards related to land use and site development.

INFRASTRUCTURE GOAL:

- 6.5 Develop a system of infrastructure that promotes energy conservation, substitution of low-impact renewable energy sources for non-renewable sources, and which provides sustainable, reliable, and affordable energy for the region.

POLICIES:

- 6.26 Projects that create and improve pedestrian and bicycle transportation are strongly encouraged.
- 6.27 Encourage projects with substantial regional impact to use energy efficient lighting and heating systems in their design.
- 6.28 Alternatives to the private automobile should be encouraged, and provided for in every plan for large-scale development, particularly those remote from other employment or residential centers.
- 6.29 Park and ride lots should be encouraged, permitted and developed at logical locations within the region.
- 6.30 Developers of commercial and industrial projects should be encouraged to use fewer and smaller parking spaces and lots and encourage the use of energy-saving alternative means of transportation such as providing reserved spots for car/van pool parking, bike racks, safe pedestrian circulation, and where warranted, transit stop locations.

OBJECTIVES:

- 6.8 Provide technical assistance and support to local municipalities seeking to promote land use patterns that encourage energy conservation, including transportation alternatives such as bike trails, sidewalks, and public transit; and which promote settlement patterns that encourage energy conservation.
- 6.9 NRPC should work with communities to establish incentives for developers to accommodate alternative transportation possibilities in their plans and with employers to encourage their employees to reduce reliance on the single occupancy vehicle.